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LEAFHOPPERS OF MAINE

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BULLETIN 238.

LEAFHOPPERS OF MAINE.*

HERBERT OSBORN, CONSULTING ENTOMOLOGIST.

Introductory.

The insects known as leafhoppers are technically included in the group *Jassoidae* but frequently the term is made to include the froghoppers, *Cercopidae*, and some of the *Fulgoridae*, the minute grass feeding species being very similar in habit.

While this report deals mainly with the leafhoppers proper it has seemed worth while to include some mention of the related forms and while less effort has been given to their collection it will be seen that some of the species on account of their abundance and attack on cultivated plants are not to be overlooked in any careful study of this general group of plant feeders and their relation to useful plants.

The principal economic importance rests on their attacks upon such farm crops as oats, timothy, wheat and the various cereal and forage crops, on fruits of various kinds and upon forest and shade trees their occurrence in this connection being very general indeed.

No previous systematic or comprehensive study of the Maine species of this group has been published and but few scattering records of species occur in the references to the Maine fauna, apparently very few specialists having collected here for this group. The Van Duzee catalogue includes a number of species credited as occurring in the state or with the general statement Maine to California, but very few specific citations. My own collection includes a number of species collected by Mr. O. O. Stover who at one time proposed to publish a list of the Maine

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species but this seems never to have been completed. I have also seen a number collected by Mr. H. G. Barber.

No specimens of Mr. Stover's collecting are preserved so far as I learn at the Maine Station and the species deposited here consisted of a small series determined by Mr. Van Duzee.

While the present list cannot be considered as complete it is probable that most of the more common species and a good proportion of the rarer forms have been secured and certainly most of the species of present or probable future economic importance have been noted.

As compared with the New York list of 175 species it seems somewhat small, but many of the more southern forms of southern New York disappear, while the Adirondacks present many of the boreal species. Furthermore the New York list has been the result of many years of work and includes the results of such specialists as Fitch and Van Duzee.

The leafhoppers affecting the cereal and forage crops constitute a very constant factor and the extent of the drain on such crops is doubtless very much greater than is appreciated. In some estimates made by the writer these insects were taken in grass land at the rate of one and a half to two millions to the acre and in many instances recorded grain fields have been very badly injured. (See Bul. 108 Bur. Ent. U. S. Dept. Ag.) It may be stated that no such serious devastations have been noted so far in Maine but meadows and grass lands have shown their presence in large numbers and of several species. Those most in evidence have been *Cicadula 6-notata*, *Deltoccephalus mimicus*, Say, and *configuratus* Uhl., *Acocephalus striatus*, *Draculacephala mollipes*, *angulifera*, and *norcaboracensis* these being discussed somewhat in detail in later pages. The drain from these species while generally overlooked is certainly of economic importance.

The species affecting fruit and garden crops are more commonly noticed as for some of the species the damage is very apparent. This is especially true of the grape leafhopper, *Typhlocyba comex*, which causes the whitening and withering of the leaves and the apple leafhopper, *Empoasca mali*, which affects not only apple but quite commonly such crops as potatoes, beans and other garden crops. This species is common and widely distributed in Maine and under favorable conditions for increase might become a very troublesome pest.

The species affecting forest trees, while a very great number and having a very wide distribution over different kinds of forest trees, are still so widely scattered that it is difficult to suggest any methods by which their numbers may be controlled. Probably nearly every species of forest trees is subject to the attack of some kinds of the leafhoppers and certain species such as the birch, pine, willow, etc., are affected by a number of different kinds which in some cases have become so abundant as to cause serious injury and no doubt are a constant drain upon the growth of the trees. While they do not cause an immediate destruction of the trees it is easy to see that such a drain going on constantly year after year during the period of growth must affect the rate of wood formation and consequently provide a distinct factor in retarding the growth of the forest crop.

This is perhaps at present a somewhat negligible factor because of present methods of the lumbering or forest management as there is possibly a much greater loss from wasteful methods of cutting or from forest fires than can be charged to these insects. However, this should be counted as one factor in the successful growth of a forest crop and it is desirable that the species be known and the particular plants that they affect should be determined and that their life history and habits shall be determined as a basis for any possible general measures that may be suggested from such definite knowledge.

For park and shade trees the problem is somewhat different and there are many cases where direct treatment may be available for the control of the injurious forms. Among the most noticeable ones are the various species of *Oncopsis* affecting the birch, this tree apparently being the favored food plant for a number of different kinds. Often these swarm in large numbers and it is hardly possible to beat any individual birch tree during the proper season without securing specimens of these species.

The conifers are affected by several different forms but the more distinctive ones belong to a related family, the *Cercopidae*, and certain of these species, (*Aphrophora*) occasionally occur in such great abundance that the growth of the trees must be very seriously retarded. Moreover, the punctures which they cause may very likely serve as the points of entrance for vari-

ous fungus diseases, blights, etc., so that the destructive possibilities are much more serious.

The willows are also very generally infested by several species of *Idiocerus*, *Pediopsis*, *Empoasca*, and *Scaphoideus* occurring on these and some of them being restricted very closely to the willow family and in some cases depending upon particular species of this family for their subsistence. While these trees are at present of rather small commercial value their possible value for the making of paper pulp is likely to bring them into importance in the future.

The common alders also support a number of distinct forms of leafhoppers and while the value of this plant is of minor importance as furnishing any particular product, the common occurrence of the clumps and their distinct place in the landscape renders them of no small account.

METHODS OF CONTROL.

There are certain methods of control that may be applied to the various kinds of leafhoppers and a general statement of these may serve to avoid repetition for each species. These methods vary of course for the different groups and may also be affected by local conditions or special methods of cultivation, that may be in vogue for certain crops or for certain localities.

Crop rotation is one of the general measures that is of service here as for many other insects and it may be assumed that the general practice of rotation in connection with a number of the field crops is a probable reason that the leafhoppers are no more injurious to such crops as oats and potatoes.

Clean culture is also to be credited with the reduction of numbers for many species, especially those which develop upon annual plants and migrate to adjacent fields. The careful attention to destruction of such weeds as fox-tail, witch-grass, crab-grass, etc., must have a decided effect on the abundance of the species that work readily on timothy and other pasture or meadow grasses.

Mowing is a measure that may be resorted to for the reduction of meadow species but its greatest usefulness must depend on timing the cutting to the period of greatest abundance of eggs or of very young larvae.

Burning is a most effective method of treatment for many species if the character of the crop permits. It is especially applicable to grass lands which are in condition to be burned over in late fall or early spring as at such times not only the eggs occurring in grass leaves but any hibernating forms are pretty certain to be reached. Observations by Mr. Woods on the burned over tracts of blueberry indicate quite strongly that the method serves a very excellent purpose in reducing the numbers of these insects as well as in other benefits to the crop. A further study of this matter however is needed to establish the extent and duration of the effect for this particular crop.

Spraying—In some instances the use of sprays may be resorted to but the effect of such treatment has not been thoroughly tested as yet. With modern machinery for spraying it is entirely possible to cover pastures or meadows of ordinary size with a spray of kerosene emulsion or other insecticides and if such an application is made early in the season, at the time to catch the bulk of the newly hatched larvae, the result should be of great advantage. For this purpose a machine with a spread of ten or fifteen feet including a number of nozzles capable of giving a broad-cast spray, accompanied by some device for disturbing the hoppers so that they will jump from the grass and be wet by the spray, should be most effective. Experiments with this method are desirable in order to determine the most effective arrangement of machinery and the expense involved.

The hopper dozer method consists in the use of a strip of sheet iron, ten or fifteen feet in length, coated with coal tar drawn over the surface of the grass land with about the rate of a rapid walk. Its operation depends on the fact that the hoppers when disturbed jump up a few inches from the grass and this means that they will usually fall back upon the tar surface, and be caught. In some experiments of this kind leaf hoppers were caught at the rate of over half a million to the acre. And while some individuals escape it is believed that a large portion may be caught by this method. Various arrangements of the sticky surface may be used and tree tangle-foot would doubtless be as effective as coal tar.

For the species that affect forest trees it is of course impossible to make any direct application and there seems to be little opportunity to use measures of control. It seems possible, however, that when timber is being cut that a little attention to the disposition of branches and twigs, which may include the eggs of these insects, would have some effect in reducing the numbers. If these are cut at the time when eggs are included and simply left scattered in the forest the larvae are hatched, are likely to secure sufficient food to develop, and then be scattered on standing timber that is left and of course cause a greater amount of damage than where the forest has been untouched.

CLASSIFICATION.

As an aid in the recognition of the different kinds of leafhoppers it will be desirable to include certain keys and brief descriptions of the species and it may be remarked that the members of this group are to be recognized generally by their minute size, none of the species reaching more than one-half inch in length and the great majority being from one-eighth to one-fourth inch long and usually rather slender with delicate wings. They rest usually with the legs drawn up well to the front part of the body and in position for immediate jumping and, when disturbed, they give strong leaps which may carry them for several feet or enable them to take wing and travel readily for some distance. The species that are common in grasses and low herbage will be generally recognized by the sudden jumping and short flight when they are disturbed and in some instances, where they occur in considerable numbers, their presence will be noticed, when walking through a meadow or pasture, as there is a distinct swarm of these insects rising as one passes along.

These leafhoppers are to be distinguished from the froghoppers, *Cercopidae* by the structure of the hind tibiae, these being slender, prismatic in section with two series of small spines along the border while in the *Cercopidae* there are two or three spines along the tibia but a wide circlet or crown of spines at the tip.

KEY TO THE FAMILIES OF JASSOIDEA.

- A. Elytral nervures forking on the disk
 - b. Ocelli located on the disk of the vertex *Tettigoniellidae*
 - bb. Ocelli located on border of vertex or between vertex and front
Jassidae
 - bbb. Ocelli located on front distinctly below border of vertex
Bythoscopidae
- AA. Elytral nervures forking at base and running to apex of elytra, ocelli usually wanting *Typhlocybidae*

KEY TO THE GENERA OF BYTHOSCOPIDAE.

- A. Antennae inserted in a deep cavity beneath a ledge.
 - b. Striation of pronotum transverse.
 - c. Side margins of pronotum sharply keeled, of moderate length. *Macropsis.*
 - cc. Side margins of pronotum not sharply keeled very short. *Oncopsis.*
 - bb. Striation of pronotum running obliquely from the middle of its front margin to its hinder angles. *Pediopsis.*
- AA. Antennae inserted in a feeble cavity, their base free.
 - b. Head with eyes wider than the elytra at the base, membrane with an appendix. *Idiocerus.*
 - bb. Head with eyes as wide as the elytra at base, no appendix. *Agallia*

Oncopsis pruni Prov.

Bythoscopus pruni Provancher Pet. Faune Canad. III 290, 1890.

Bythoscopus pruni Van Duzee Entom. Amer. VI, 227, 1890.

A little smaller than *fenestratus* and generally darker, the elytra hyaline with veins black, these being accentuated on the cross nerves so as to form irregular cross bands and an apical band or spot. Length 4 to 4.5 mm.

This appears to be one of the most common and widely distributed species in the state. While described as from the plum and occasionally taken on various plants including blueberry, poplar, etc., our collections show it to occur very generally on birch and all other collections seem to be in association with this tree so I believe this may be considered the usual food plant for the larval form. At Orono it has been taken on many dates from June 5th to August 6th mostly on birch. At N. Harpswell Aug. 12; Highmoor Farm Aug. 15th on birch and blueberry at Mt. Katahdin Aug. 20-21st up to table land 4500 ft. elevation, at the latter place probably from willow as no birches were seen. Specimens in the Boston Society of Natural History are from Calais.

The species may be considered as covering in its distribution the birch forests of the state and it must undoubtedly be counted an economic

factor in the growth of this timber tree. The insect acquires its growth in the early part of the summer and mainly disappears by the middle of August.

Oncopsis fenestratus Fitch

Athysanus fenestratus Fitch Homop. N. Y. State Cab. p. 60, 1851

Bythoscopus fenestratus Van Duzee Entom. Amer. VI 226, 1890.

Grayish brown with whitish hyaline spots on the elytra and dark patch on the front. About 4.5 to 5 mm in length.

This species has been taken in considerable numbers chiefly from birch but specimens referred here are from willows also, though birch would seem to be the main food plant and the one on which it would have the most importance. On Mt. Katahdin it was found at various altitudes and one specimen evidently belonging here was collected near the summit, 4,500 ft. probably from the scrub willows.

Oncopsis minor Fitch.

Bythoscopus minor Fitch Homop. State Cab. p. 60, 1851.

Bythoscopus minor Van Duzee Entom. Amer. VI 228, 1890.

Specimens referred here resemble *fenestratus* but are smaller and agree well with Van Duzee's description. They are gray brown, the elytra in the female almost entirely hyaline and in the male clouded with tawny brown. Length 4 mm.

Larvae taken in association with males on birch June 11, 1913, and probably belonging to this species are uniformly brown.

Oncopsis variabilis Fitch.

Athysanus variabilis Fitch. Homop. N. Y. State Cab. 1851, p. 60: reprinted in Lintner 9th Rep't 1893, p. 400.

An extremely variable species occurring abundantly during spring and early summer on birches. A common variety is sulphur yellow with more or less of black on the elytra most commonly as a line or stripe along the claval suture. Length 5-6 mm.

Our collections represent Orono, particularly June 3 to Aug. 6, as the species does not persist through the summer and it had disappeared by the time our collections were extended to other parts of the state. I have a record for Mt. Katahdin (H. G. Barber) and specimen in Boston Soc. N. H. are from Calais and Eastport (C. W. Johnson). It must occur over a large part of the state and its attacks on the birch must be a source of injury.

Oncopsis sobrius, Walk.

Bythoscopus sobrius Walk. Homop. 1851. 3 : 874; Fitch, reprinted in Lintner, 9th Rep't. 1893, p. 400; N. Y. State Agricultural Soc. Trans. 1858. 18 : 853.

This species is light colored the head, pronotum and scutellum yellow and the elytra light tawny. The front is full and with vertex and pronotum forms an almost globular front end. Length 4-5 mm.

Very abundant, particularly on birches, but has been taken on ferns and other roadside plants and on oaks but always near birch which is doubtless the normal food plant for the larva. Records for Orono on June 3 and Aug. 5, N. Harpswell Aug. 12, Highmoor Farm Aug. 15, and the species apparently disappears for this region about the middle of August as it has not been taken later. No specimens were secured in the northern part of the state in 1913 but this may have been on account of its being out of season. A record for Auburn July 18 is furnished by Mr. C. W. Johnson.

Oncopsis cognatus Van Duzee.

Bythoscopus cognatus Van Duzee, Trans. Am. Entom. Soc. VI 224, 1890.

This is a large species, gray in color, with rather indefinite markings resembling *fenestratus* but with different genital segment. Length, 5 mm.

A series of specimens taken from hazel in June by Mr. Shaw are referred to this species. It appears to come at an earlier date than many of the other species and if the hazel is a regular food plant it may be counted as a well separated species.

Owing to the small economic value of the food plant it can hardly be counted of much importance and so far it seems to have been found in rather small numbers.

Oncopsis nigrinasi Fitch.

Athysanus nigrinasi Fitch. Homop. N. Y. State Cab. 1851, p. 61; reprinted in Lintner, 9th Rep't, 1893, p. 401.

Usually marked by the conspicuous black color of the front. Length 5 mm.

Van Duzee says. "June to August. Abundant everywhere on hornbeam," (Buffalo, Hemiptera p. 195), but the specimens we have referred to this species, collected by Mr. Shaw are from hazel. Aug. 1 and Aug. 7, and viburnum July 22. There is also a record for July 28 and 31, but without note of food plant.

Pediopsis viridis Fitch.

Pediopsis viridis Fitch. Homop. N. Y. State Cab. 1851, p. 59; reprinted in Lintner, 9th Rep't, 1893, p. 399.

Uniform green without marking, its color blending perfectly with color of the willow on which it lives. Length 4.5 to 5 mm.

Often very abundant and its distribution in Maine evidently covers the entire state as specimens have been taken at Orono, July 22-30, Portland, Aug. 13, Mt. Katahdin Aug. 22, Houlton, Aug. 24, Mars Hill Aug. 25.

The slight commercial value of its food plant makes it of little economic importance but where the willow is of value the species must be counted plentiful enough to be detrimental to the tree.

Pediopsis basalis Van Duzee.

Pediopsis basalis Van Duzee. Am. Ent. Review, 1889. p. 171; Cat., p. 260; Prov. Pet. Faune Ent. Can. 1890, 3 : 295.

Known by the conspicuous dark brown basal marking of the clavus which contrasts with the yellowish color of the other part. Length 5 mm.

Taken at Orono, 1913-1914 and at Highmoor Farm Aug. 15, 1913 on poplar. Only a few specimens have been secured on any occasion and the species is evidently one which occurs ordinarily in small numbers and has little economic importance.

Pediopsis bicolor n sp.

A large black species greenish white below, of form of *basalis* but very differently colored and showing no trace of the dark band on base of elytra. Length 5.5 mm. width 1.5 mm.

Head obtusely angled, the vertex narrow, pronotum roundly angled in front, the hind border concave, broadly angular at middle, rugae coarse and rather short; elytra long and narrow.

Color smoky black above, the angles of the scutellum showing a more intense coloring and the elytra near the tip with a faintly transparent space noticeable in proper light. Below, face on upper half smoky brown, shading to lighter at middle, but changing rather abruptly to the dingy greenish white of the lower half. Pectus, venter and legs greenish white or, anteriorly, somewhat yellowish, the propleura without black spot. Pygofer with a black spot each side a little behind the middle.

This species presents a very distinct aspect and while it might be suspected of being a black form of some of the known species the fact that it is so light colored below and the difficulty in connecting it with any of the described species warrants a specific description. Two specimens were taken from a broad leaf willow at Orono July 11, 1914.

Pediopsis virescens Fab.

Cicada virescens. Fab. Syst. Rhyn. p. 79.

Pediopsis virescens, var *graminea*, Osborn, N. Y. Ent. Rept. 20. (1905) p. 505. Edwards Hem. Homop., p. 06.

Approaching *viridis* but smaller and more slender with a conspicuous black spot on the base of the hind tibia. Female, length 5 mm. width 1.25 mm. Male, length 4.4 mm. width 1 mm.

Vertex very short, strongly angled, rounded at extreme tip; pronotum sharply angled in front, sloping to front and sides, concave behind or with hind border subangularly excavated.

Color of female light green, elytra becoming transparent toward tip; eyes brown; a black spot at base of tibia; tarsi yellowish brown; male slightly darker than female the elytra in one specimen faintly, in the other distinctly smoky; scutellum with a black triangle in lateral angles, eyes and tarsi as in female and the black spot on base of hind tibiae distinct.

Three specimens, one female and two males, taken in sweeping on a clump of *Cornus* July 22, 1914, near Orono, on Dr. Patch's farm. No nymphs were taken and it is unsafe to regard *Cornus* as positively the food plant as there were willows in the vicinity and as there was a strong wind blowing these individuals may have been carried from these or some of the other trees in the vicinity. However no corresponding forms have been taken in extensive sweeping in the same locality on willows and other native shrubs and trees. The black spot at base of hind tibiae is a very distinct feature and separates the species at once from any others known to me.

This species is apparently identical with the European form and has been recorded for America but once, in my report upon the "Jassidae of New York," (1905). 20th Rept. State Entom. N. Y., p. 505. The New York specimens were referred to the variety *graminea* in which there is a black spot at tip of vertex.

Pediopsis trimaculata Fitch.

Pediopsis trimaculata Fitch Stata. Cab. Nat. Hist. p. 60, 1851.

Pediopsis insignis Van D. Ent. Am. V. 171, 1889.

Pediopsis trimaculata Osborn and Ball Day. Acad. Nat. Sci. VII 110, 1898.

This species is dull yellowish brown or in the male gray brown with three white spots on the elytra. Length 4-4.25 mm.

A single specimen of this species has been taken at Orono July 25th, 1914.

Pediopsis sordida Van Duzee?

Pediopsis sordida Van D. Can. Ent. XXVI, p. 89, 1894.

One specimen doubtfully referred to this species was taken at Orono July 3, 1914. It agrees quite closely with the description except in some of the color details but heretofore *sordida* has been recorded only from Colorado. It would be undesirable however to describe as a new species the single specimen in hand with the strong probability that *sordida* has an extended range in the northern part of the country. This specimen is 4.5 mm in length.

Pediopsis ferruginoides Van Duzee.

Pediopsis ferruginoides Van D. Ent. Am. V 181, 1889.

This is a dark species with ferruginous coloring but quite variable in intensity, the single specimen taken in Maine referred to the species being darker than the rule. Length 5 mm. It was collected July 15th, 1914 and if correctly placed extends the range from Iowa which is the most easterly point hitherto recorded.

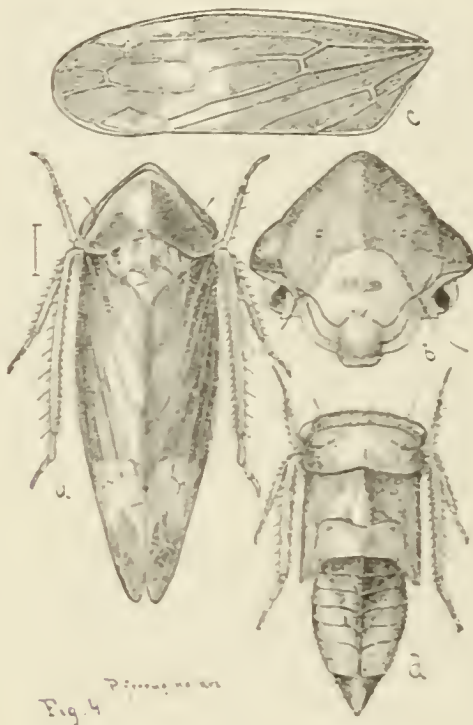


Fig. 11. *Pediopsis ferruginoides*: a. dorsal view; b. face; c. elytron; d. nymph. (After Osborn and Ball.)

Pediopsis suturalis Osborn and Ball

Pediopsis suturalis Osborn and Ball Pr. Dav. Acad. Sci. VII. 67.

Light yellow with a conspicuous black oblique stripe bordering the claval suture. Length 6 mm.

Two specimens taken at Highmoor Farm Aug. 15-16th are so far the only representatives found in the state, and it would seem that it is rather rare though it may have been a little past its season when collecting began.

Pediopsis bifasciata Van Duzee.

Pediopsis bifasciata Van Duzee. Entomologica Americana V. 173.

Gray brown with two fairly distinct bands across the elytra. Length 5 mm. There is considerable variation in different specimens in my collection but the three Maine specimens collected at Orono on poplar July 30, are quite uniform and all are a little more gray and with the two bands more clearly outlined than in most specimens.

The species is credited to cottonwood and poplar but it is apparently of infrequent occurrence and may be considered as of little economic importance.

Pediopsis canadensis Van Duzee.

Pediopsis canadensis Van D. Canad. Ent. XXII, p. 111, 1890.

Greenish or reddish yellow, the elytra brownish with two light bands, one near the base, the other across the apex of the clavus. Length 4.75 mm.

Maine specimens of this species were collected at Orono July 11, 12 and 19, 1914 and have the typical characters of the species, one of the specimens being distinctly reddish brown. It is evidently much less common than some of the other species and it may be considered as having little or no economic importance.

Idiocerus pallidus Fitch.

Idiocerus pallidus Fitch. Homop. N. Y. State Cab. p. 59 (1851).

Idiocerus pallidus Osborn and Ball. Pr. Dav. Acad. Sci. VII, 135.

Light green fading to greenish white in preservation, with two black points on the vertex, otherwise unmarked. Length 5-6 mm.

Common on willows and occurring generally over the state, in some cases taken also from poplar. Orono on poplar and willow July 30th and Aug. 5th larva, Portland Aug. 13th, willow, Highmoor Farm Aug. 15th, poplar, Mt. Katahdin Aug. 22nd, willow, Houlton Aug. 24th, Mars Hill Aug. 25th, Ft. Fairfield Aug. 26th, willow and poplar, Ft. Kent Aug. 28th, 29th.

On account of its very general occurrence and the great abundance of the species feeding through larval stages on willow and poplar it must be counted of economic importance wherever these trees have any commercial or landscape value.

Idiocerus alternatus Fitch.

Idiocerus alternatus Fitch. Homop. N. Y. State Cab. 59 (1851).

Idiocerus alternatus Osborn and Ball. Pr. Dav. Acad. Sci. VII, 131.

Gray with interrupted black and white veins, two conspicuous black dots on the vertex. Length 6 mm.

Another very common species on willow and with a range covering all of the state and to be found on almost every willow tree or bush that may be examined. Collections have been made at Orono July 30th, some larvae but mostly adults, Aug. 5th, Mt. Katahdin Aug. 22nd, Houlton Aug. 24th, Mars Hill Aug. 25th, Fort Fairfield Aug. 26th, Fort Kent Aug. 28th.

Economically this species stands in about the same position as *pallidus* but it is perhaps not quite as abundant and has been taken only from willows.

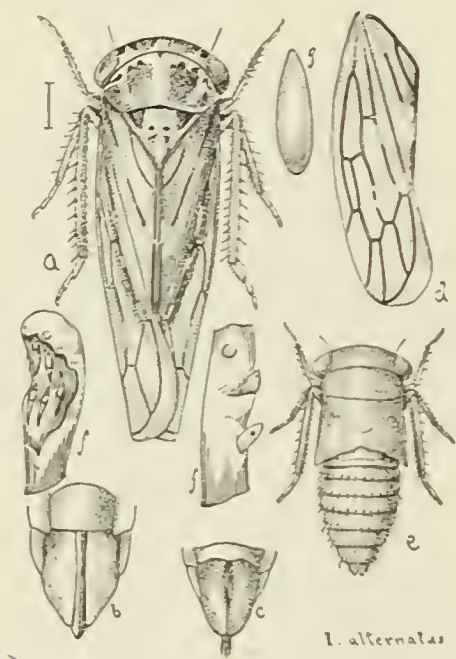


Fig. 12. *Idiocerus alternatus* Fh.: a, adult: b, female, c, male genitalia: d, elytron: e, nymph: f, eggs: g, egg enlarged. (After Osborn and Ball.)

Idiocerus suturalis Fitch.

Idiocerus suturalis Fitch, Homop. N. Y. State Cab. 59 (1851).

Idiocerus suturalis Osborn and Ball. Pr. Dav. Acad. Sci. VII. 134.

Light yellow with a conspicuous dark stripe along the line of the united elytra, without interruption. Length 6 mm.

Another common species on the willow but usually less abundant than *pallidus*. It has been reported also for birch but collections in Maine have been limited to willow and poplar. Taken at Orono Aug. 17, '05, Highmoor Farm Aug. 15th, Houlton Aug. 24th, Ft. Fairfield Aug. 26th, Ft. Kent Aug. 28th. It is hardly plentiful enough to be counted of much economic importance.

Idiocerus suturalis Fh. var. *lunaris* Ball.

Resembles *suturalis* of the typical form except that there is a conspicuous cross or lunate interruption of the black sutural stripe. Length 6 mm.

Occurs along with *suturalis* on willows and occasionally on poplars Orono Aug. 7th, Highmoor Farm Aug. 15th, Houlton Aug. 24th, Ft. Kent Aug. 28th.

Idiocerus duzei Prov.

Idiocerus duzei Provancher, Pet. Faune, Ent. Can. III, p. 292, 1890.

One specimen of this species recorded from the collections by Mr. O. O. Stover. It is a large light yellow species with golden iridescence, 7 mm long a little larger than *suturalis* and without the black sutural line.

Idiocerus lachrymalis Fitch. .

Idiocerus lachrymalis Fitch. Homop. State Cab. p. 58 (1851).

Idiocerus lachrymalis Osborn and Ball. Pr. Dav. Acad. Sci. VII, 130.

A large gray species with distinct transverse line on front of vertex and with two conspicuous black round dots on vertex. Length ♀ 7 mm, ♂ 5.5 mm.

This is a common species on poplars apparently favoring the aspen and has been taken at Orono July 30th, Houlton Aug. 24th, Ft. Fairfield Aug. 26th, Ft. Kent Aug. 28th. Mt. Apatite collection Bost. Soc. Nat. Hist. In some cases it is plentiful enough to be considered injurious, the larvae especially draining the trees during the early part of the summer.

Idiocerus provancheri Van Duzee.

Idiocerus provancheri Van Duzee. Buf. Soc. Nat. Hist. Bull. V. 194 (1897).

Idiocerus provancheri Osborn and Ball Proc. Dav. Acad. Sci. VII, 127.

This handsome species is chocolate brown with a bright yellow oblique spot across the base of the clavus. Length 6 mm.

From earlier observations this is said to occur on different species of *Crataegus* but our collections in Maine were in all cases made where this tree was not seen and I believe it must have other food plants. At Orono it was taken in the Bangor bog among the scrubby growth of bushes and conifers.

Agallia 4-punctata Prov.

Bythoscopus 4-punctata Prov. Nat. Canad. IV, 376, 1872.

Agallia 4-punctata Van Duzec. Entom. Amer. V, 167, 1889.

Agallia 4-punctata Osborn and Ball. Proc. Dav. Acad. Sci. Vol. VII, p. 48.

This is a broad robust species, gray brown in color and about four millimeters in length. There are four distinct dark dots above, two on the head and two on the pronotum. Length 4 mm.

The species is very generally distributed over the country and we would expect to find it over most of the state especially as it was described by Provancher from Quebec, but it has occurred in the collecting of the season of 1913 only in two localities being taken by Prof. A. P. Morse at Grand Lakes Stream and by Mr. C. P. Alexander at Houlton. In 1914 it was taken a number of times at Orono in July and August.

It feeds on a variety of plants but if the past two seasons are any criterion it will not be of any economic consequence in Maine.

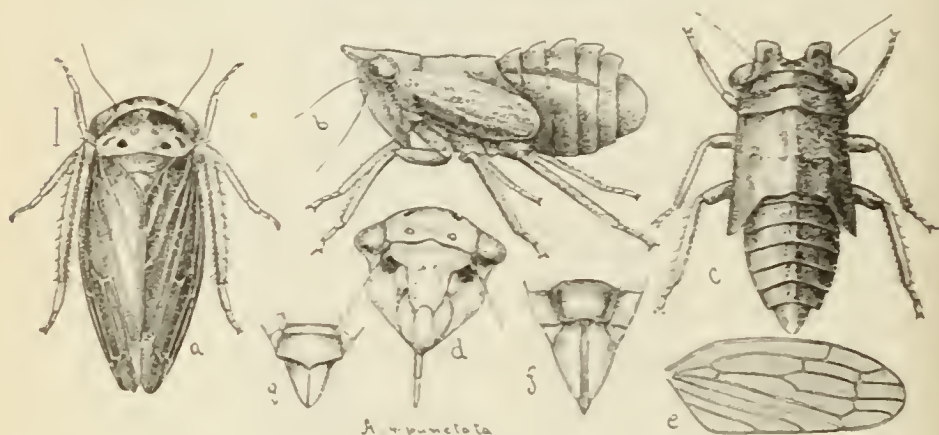


Fig. 13. *Agallia 4-punctata*: a, adult; b, nymph, side view; c, nymph: d, face; e, elytron; f, female; g, male genitalia. (After Osborn and Ball.)

Agallia novella Say.

Jassus novellus Say. Acad. Nat. Sci. Phila. Jour. VI, 309, 1831.

Agallia novella Van Duzee. Canad. Ent. XXI, 8, 1889.

Agallia novella Osborn and Ball, Proc. Dav. Acad. Sci. Vol. VII, p. 54.

A slender light colored species with two small black spots on the vertex, a dark line along the suture. Length, 3.5-4 mm.

Not common in collections this season. Collected by Mr. Stover at Dexter. I secured a number by sweeping along the roadside near the Bangor Bog Aug. 5th, and at North Harpswell Aug. 12th and Mr. Alexander collected a few from firs June 10th. An adult female was collected from *Cornus* July 24, 1914, at Orono. It is evidently of little or no economic importance in Maine.

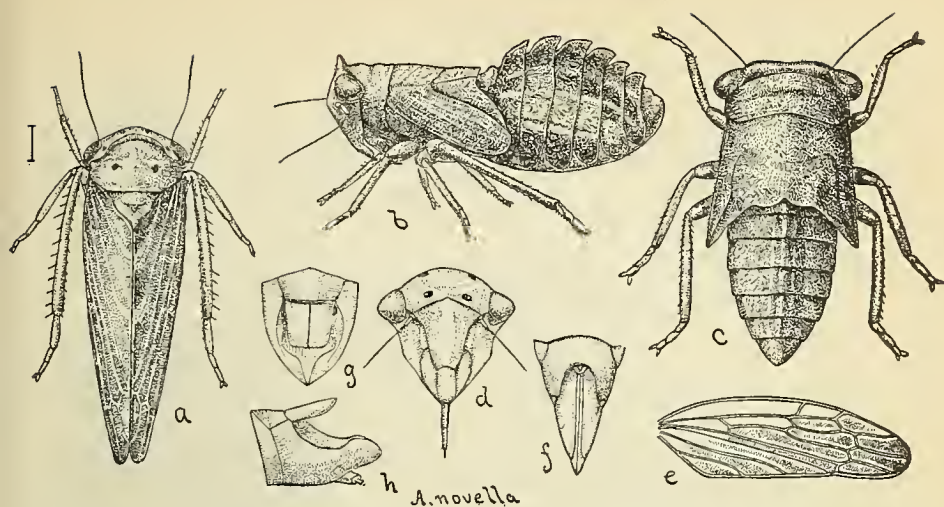


Fig. 14. *Agallia novella*: a, adult; b, nymph, side view; c, nymph, dorsal view; d, face; e, elytron; f, female; g, h, male genitalia. (After Osborn and Ball.)

Agallia sanguinolenta Prov.

Bythoscopus sanguinolenta Provancher. Nat. Canad. IV, 376, 1872.

Agallia sanguinolenta Van Duzee, Am. Ent. V, 166, 1889.

Agallia sanguinolenta Osborn and Ball. Pr. Dav. Acad. Sci. Vol. VII, p. 58.

A short robust species usually dark gray or brownish with two large spots on the vertex and two broad spots on the pronotum. Length 3 mm-3.5 mm.

This is by far the most abundant species of the genus in Maine and in fact one of the most abundant and widely distributed species of leafhoppers here, as throughout most of the United States. It has been taken at every locality where collections have been made especially in pastures and meadows. Its food is probably largely clover and allied plants but it seems able to survive on a wide range of food plants. In many parts of the country it is a destructive pest in clover and alfalfa fields.

The definite localities of collection are Orono July 24, 28, 29, 31, Aug. 1, 5, 6, 9 from garden plants, peas, etc., and meadows including timothy and clover; North Harpswell Aug. 12, Portland Aug. 13, 14, Highmoor Farm Aug. 15, Mt. Katahdin Aug. 20, 22, at various altitudes up to table land of summit 4500 ft. Houlton Aug. 24th, Mars Hill Aug. 25th, Fort Fairfield Aug. 26th, Fort Kent Aug. 28th.

The species is discussed from the economic standpoint in Bulletin 108 Bureau Entomology U. S. Dept. Agriculture.

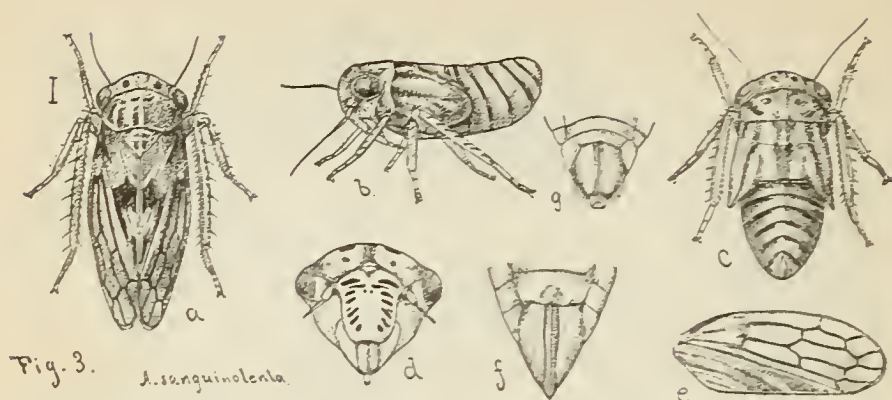


Fig. 3. *A. sanguinolenta*.

Fig. 15. *Agallia sanguinolenta*: a, adult; b, nymph, side view; c, nymph, dorsal view; d, face; e, elytron; f, female; g, male genitalia. (After Osborn and Ball.)

KEY TO THE GENERA OF TETTIGONIELLIDAE.*

- A. Antennal sockets usually overhung by a deep ledge, the anterior extremity of which is deflexed and roundly truncate. Anterior tibiae sulcate above or dilated at the extremity. Elytra narrow, not covering lateral margin of abdominal tergum. Head and pronotum usually deflexed.
- B. Thorax roundly six-angular, posterior margin rounding, with a short median excavation. Vertex longitudinally furrowed. Claval veins distant. *Aulacizes*
- BB. Thorax 4 angular, posterior margin, roundly emarginate, the anterior and posterior margins nearly parallel. Claval veins often united in the middle or approaching and tied by a cross nervure.
- C. Vertex long, triangular longer than width between eyes, side margins nearly straight, face as seen from side nearly straight. *Homalodisca*.
- CC. Vertex obtusely rounding, shorter or only equal to width between eyes, face as seen from side roundly angled. *Oncometopia*
- AA. Ledge above antennal sockets small, the anterior extremity as seen from above not projecting, included in the curve of the head. Anterior tibiae slender, round or triangular, Elytra broad, covering the abdominal tergum. Head and pronotum rarely sloping.
- B. Elytra not reticulate veined at apex, at most with five apical and three anteapical cells, head not greatly produced.
- C. Vertex with margin rounding obtuse, the front inflated.
- D. Antennae setaceous, pronotum not twice as long as scutellum, the posterior margin long not strongly emarginate. *Tettigoniella*.

* Adapted from key by E. D. Ball.

- DD. Antennae in the male enlarged at apex. Pronotum more than twice as long as the scutellum, posterior margin short, somewhat emarginate. *Helochara*.
- CC. Vertex flat, the margin sharp or line-marked, distinct, vertex and front forming an acute angle, front broadly transversely convex, not inflated. *Diedrocephala*.
- BB. Elytra reticulate veined from the apex as far back as the forking of the outer branch of the first sector. Head often produced into a triangle, longer than pronotum. *Draeculacephala*.

Oncometopia lateralis Fabr.

Cicada lateralis Fabr. Ent. Syst. sup. p. 524.

Oncometopia lateralis Ball, Iowa Acad. Sci. Proc. VIII, p. 44.

This species is dark, nearly black, the elytra purplish with yellow lateral line and markings on the head and thorax. Length 7-8 mm.

The larvae are black with yellowish white stripes, the wing pads tinged with purple. Head in front with irregular black and white mottlings, a light stripe starting at the vertex runs to tip of anal segment and a broader stripe each side runs from next the eye across pronotum to bases of wing pads along side of abdomen to apex of penultimate segment, outside of which there is a marginal white stripe. A light stripe on border and disk of wing pads; lower part of face black with yellow dots; thorax and abdomen beneath black with submarginal stripe yellow, legs black lined with yellow.

These markings are characteristic of all the moults observed and agree in the main with the color pattern of the adult. The nymphs develop evidently during the early summer months as they were taken up to August. Their food plant is not certainly determined, but two nymphs were taken on birch July 30th.

Specimens in the Station collection bear records of Orono June 7, 12, 27, 1905, July 2 and 21, 1905, and I took it in 1913 at Houlton Aug. 24th, Mars Hill Aug. 25th, and Fort Kent Aug. 28th, in bog and low ground.

This is a northern species and it may be expected throughout most of the state, but unless in greater numbers than observed so far it can not be considered of great economic importance.

Kolla bifida Say.

Tettigonia bifida Say. Acad. Nat. Sci. Phila. Jour. 1831, 4.

A handsome species with conspicuous black and white transverse bands on head and longitudinal stripes on the elytra. Length 6 mm.

This is one of the species that we would expect to find generally over the state, but I have taken it only near Portland (Stroudwater Aug. 13), (Riverton Park) Aug. 14th. There is a specimen in the Maine Experiment Station collection with record of collection at Pushaw Pond. Possibly it reaches its North Eastern limit in this region.

Tettigoniella gothica Sign.

Tettigonia gothica Sign. Ann. Soc. Ent. Fr. 1854, p. 345.

Tettigonia hieroglyphica, in reference from Eastern states (Nec. Say).

Tettigonia similis Woodw. Ill. State Lab. Bul. 3, 1887, p. 25.

As Ball has pointed out this species must have been the basis for records of *hieroglyphica* in localities east of Illinois.

It is light reddish or grayish green, the head with several lines on the vertex which double on each other, nearly parallel with median line, and prominent spot at apex black. Length 5.5 mm to 6 mm.

It occurs in great numbers in the undergrowth along the margin of thickets and may be collected by thousands in almost any suitable locality.

The larva is light yellow with a dark stripe on each side, a broad median stripe light, narrowing at tip of vertex and on last segment of abdomen. Eye black anteriorly and posteriorly with vertical yellow band including black dot. Beneath with eyes light greenish yellow, tips of tarsi black.

Both larvac and adults have been taken in large numbers at every point where collections have been made from Portland in S. W. and Van Buren and Ft. Kent in N. E. and its distribution may be considered as covering the state. Actual records are at Orono, on oak. June 21. nymphs only Aug. 5. nymphs and adults, N. Harpswell. Aug. 12. Portland. Aug. 13 and 14. Highmoor Farm Aug. 15. Mt. Katahdin up to lower altitude Aug. 20-22. Houlton Aug. 24. Mars Hill. Aug. 25. Ft. Fairfield, Aug. 26. Ft. Kent Aug. 28.

It occurs, however, on a great variety of plants and in such numbers as must become a serious dramm. Its great range of food plants will make it a difficult species to control, but in grass land or in fields it is open to same methods of attack as other grass species. The nymphs have been taken from grass land as well as from some shrubs and trees and adults are recorded from birch and willow.

Penthimia americana Fitch.

Penthimia americana Fitch. Homop. N. Y. State Cab. 1851, p. 57: reprinted in Lintner 9th Rep't 1893, p. 397.

A thick bodied dark red or blackish species appearing bluntly rounded at both ends and closely resembling members of the Froghopper family (*Cercopidae*). Length 5 to 6 mm.

This species would be expected over a considerable part if not the entire state as it is common in N. Y. and westward, but this season has been taken but once, a single specimen being beaten from bushes in the Bangor bog near Orono on Aug. 30th, and one July 10, 1914. Van Duzee gives its distribution as New York to Florida and Mich. so this record extends its known eastward distribution over New England. Evidently it may be disregarded from the economic view point.

It seems hardly probable that it should be so rare or that this represents its limit of distribution and it may be looked for at other points.

Diedrocephala coccinea Forst.

Cicada coccinea Forst. Nov. Sp. Ins. p. 96, 1781. ,

Tettigonia teliformis Walk. Homop. III, p. 764, 1851.

Diedrocephala coccinea Ball. Pr. Ia. Acad. Sci. Vol. VIII, p. 29, 1901.

(For further synonymy see Ball, 1 c.)

This is a handsome yellow species with brilliant red and blue or green stripes on the elytra and a black border on the upper margin of the face. Length 5-6 mm.

Specimens of this species will be found in almost every locality where collections may be made anywhere in the eastern states. There are specimens in the collection dated Sept. 10, '05 and '06 and it was collected in 1913 at Grand Lakes Stream (A. P. Morse) Aug. 15-16, at Orono July 29 and Aug. 5th, North Harpswell Aug. 12, Riverton, near Portland, Aug. 14, Highmoor Farm Aug. 16, Mt. Katahdin at lower levels Aug. 22-23, Houlton Aug. 24, and in considerable frequency during summer of 1914. It has been taken on a number of plants as Viburnum, Poplar, Strawberry and especially in damp woods on ferns where the larvae are also abundant in mid summer. These latter are yellow with bright red stripes on the wing pads.

While quite abundant, observations so far have not indicated serious attack upon any cultivated crop.

Draeculacephala noveboracensis Fitch.

Aulacizes noveboracensis Fitch. Homop. N. Y. St. Cab. p. 56, (1851).

Diedrocephala noveboracensis Osborn and Ball. Pr. Ia. Acad. Sci. IV, p. 177, 1897.

Draeculacephala noveboracensis Ball. Pr. Ia. Acad. Sci. VIII, 37, 1901.

This species which has been recorded as occurring from Vermont to Vancouver Id., has been taken in abundance at Orono on its usual host plants, the coarse grasses of low ground, and wherever these grasses have any commercial value the species may be counted injurious.

It is one of our larger leafhoppers and while a conspicuous insect away from its food plant its slender form and bright grass green color merge so closely with the plant stems and leaves that it is seldom seen till beaten or swept into the collecting net.

The head is less angular than in *mollipes* or *angulifera* and the lines and dots somewhat coarser. Length about half an inch.

Adults and nymphs are both taken during July but by the latter part of this month nearly all have matured. In localities further south two broods are recognized but this is not yet determined for Maine.

Our records cover Orono, July and Aug., N. Harpswell Aug. 12, Portland Aug. 13, Highmoor Farm Aug. 16, Mt. Katahdin, from 600 to 1500 ft. Aug. 20 and 22, Ft. Kent Aug. 28, and it has been taken generally wherever collections have been made on its usual food plants.

Draeculacephala angulifera Walk.

Tettigonia angulifera Walker, Homop. III, p. 771, (1851)

Diedrocephala angulifera Van Duzee Ent. News, V, 156.

Draeculacephala angulifera Ball. Proc. Ia. Acad. Sci. VIII, p. 35, (1901).

This is a large green leafhopper resembling very closely the *novaboracensis* from which it differs in having a slightly sharper pointed head with finer lines and smaller dots nearer together at the apex. It is about half an inch in length.

Adults have been taken in large numbers during late July and early August at Orono and the drain they cause in the grasses where they occur must be of no little importance. Aside from the coarse grasses of lowlands it has occurred in large numbers in timothy meadows and while it may have been feeding mainly on some of the coarser grasses mixed with the timothy it appeared to occur on the timothy as well and it may therefore be counted of greater importance. The larvae must get their growth largely before the first of August as adults are the abundant stage at this time.

Additional locality records are, Portland Aug. 13, Princeton Aug. 16, (A. P. Morse), Kineo Aug. 17, Mt. Katahdin 600 ft. and 4700 ft. on tableland, Houlton Aug. 24, Van Buren Aug. 27th, Ft. Kent Aug. 28th.

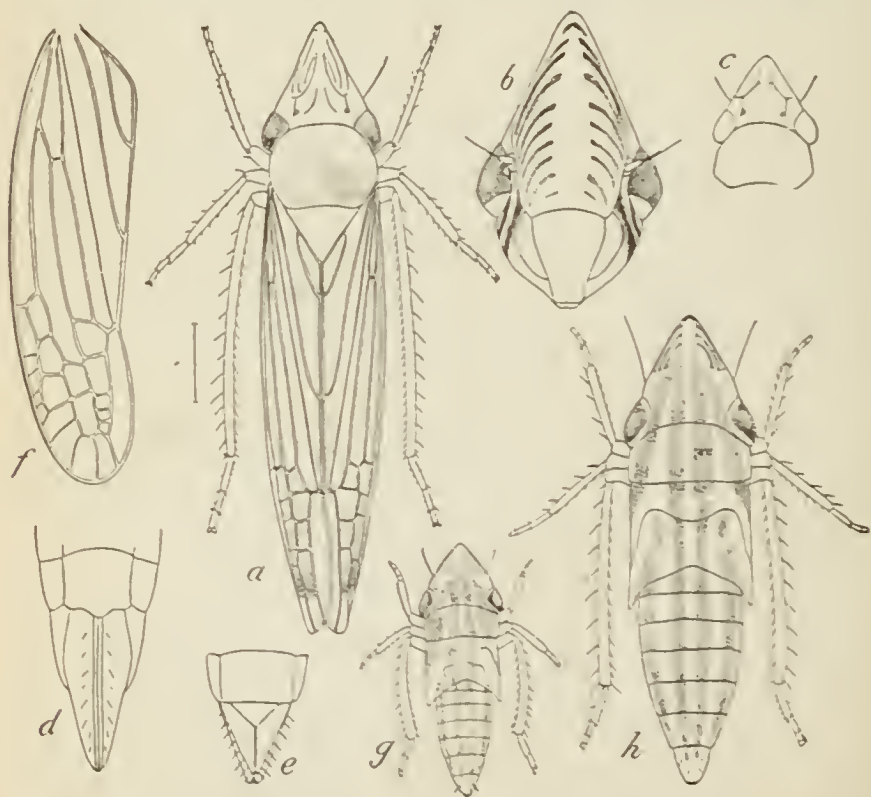


Fig. 16. *Draeculacephala mollipes*: a, Adult from above; b, face; c, vertex and pronotum; d, female genitalia; e, male genitalia; f, wing; g, h, nymphs. All enlarged. (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108).

Draeculacephala mollipes Say.

Tettigonia mollipes Say. Acad. Nat. Sci. Phila. Jour. (1831.)

Draeculacephala mollipes Ball. Ia. Acad. Sci. Proc. VIII, p. 33, (1901.)

Bright green the head yellowish and very sharply angled, with very delicate lines. Beneath usually dark sometimes nearly black. Length 6-7.5 mm.

This is one of the most abundant species in the country ranging from Canada to Central America and found almost universally in grass lands on both wild and cultivated grasses. A detailed account of the species with figures will be found in the writer's bulletin on "Leafhoppers affecting Grasses and Forage Crops." (Bull. 108, Bur. Ent. U. S. Dept. Agric.)

In Maine it has been found abundant in all the southern sections. Orono July 11, 19, 26, '05. On willow (doubtless near grass) July 22, 1913. Larvae from marsh grass June 26. Adults from swamp grass June 13. Field grass June 18. Strawberry bed July 22. Timothy Aug. 1. Meadow Aug. 4 and in many other collections from meadow and pastures. Also Princeton Aug. 16, N. Harpswell common in low ground pasture Aug. 12. Portland Aug. 13, in meadow near Riverton Park Aug. 14. In pastures and meadows at Highmoor Farm Aug. 15. At Mt. Katahdin on the table land at about 4500 ft. Aug. 21, Houlton Aug. 24, Mars Hill Aug. 25, Ft. Kent Aug. 28. In the latter locality it was very scarce only a few specimens being taken and it seemed to be replaced even in upland pastures and meadows by *Helochara communis*.

Helochara communis Fitch.

Helochara communis Fitch. Homop. N. Y. State Cab. p. 56, (1851.)

This species is one of such universal distribution that it merits a brief description even though it may not be considered of great economic importance.

The adult is a dark green, sometimes almost blackish green and the surface of the body roughly pitted, the length a fourth of an inch or a trifle more. The nymphs are pale green with striations of the head faint, the wing pads in the last instar reach to base of the third abdominal segment.

It is usually found in great abundance in boggy places and feeds upon the grasses common to such places. It is no doubt the cause of a severe drain upon the plants but as such plants have a very constant moisture supply the effect of their work is not very apparent and as the grasses are such as have a minor importance for forage the insect may be counted of less consequence than some of the species of fewer numbers that feed upon important farm crops. A fuller account of the species may be found in Bulletin 108 Bureau Entomology U. S. Dep. Ag.

The Maine records include Orono where specimens have been taken many times during the summer of 1913 and Grand Lake Stream and

Princeton, collected by Prof. A. P. Morse, North Harpswell Aug. 12, Portland Aug. 14, Mt. Katahdin Aug. 21, Mars Hill Aug. 25, Ft. Fairfield and Phair Aug. 26, Van Buren Aug. 27, Ft. Kent Aug. 28-29. In the northeastern part of the state it occurs very commonly on uplands in pastures, meadows and oatfields and was even taken on potato vines so it must be counted of greater economic importance than where it is confined to boggy or swampy lands. It probably selects succulent plants and its distribution is affected by climate or season.

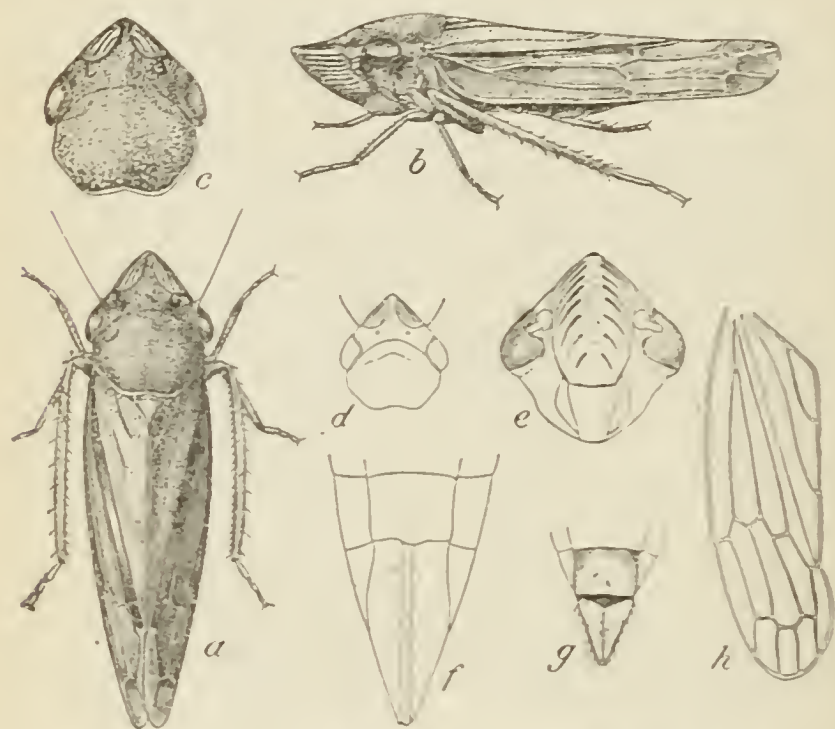


Fig. 17. The bog leafhopper (*Helochara communis*): a, Adult; b, side view; c, head and pronotum of female; d, head and pronotum of male; e, face; f, female genitalia; g, male genitalia; h, elytron. All enlarged (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108.)

Eucanthus acuminatus Fabr.

Cicada acuminata Fabricius. Ent. Syst. IV 36, 40, 1712.

Eucanthus orbitalis Fitch. Homop. N. Y. State Cab. 57, 1851.

Eucanthus acuminatus Osborn and Ball. Proc. Ia. Acad. Sci. IV, 182

Black with white markings on head and elytra. The vertex is depressed, the ocelli near the forward part of the disk, elytra with white stripes parallel to the veins. Length 5 mm.

This species has been found very sparingly in Maine, one record July 22 on *Viburnum* for Orono and another for Mt. Katahdin where a few

specimens were taken at an altitude of about 1500 to 1600 feet, also one specimen near Orono, July 10, 1914. It has never been recorded as occurring in any great abundance and though its distribution covers a large range of the northern United States and of Europe it is not counted of economic importance.

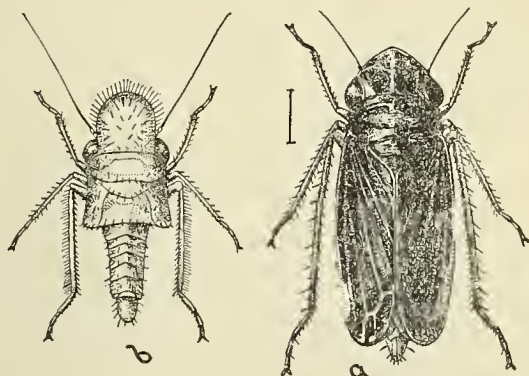


Fig. 18. *Eucanthus acuminatus* Fab.: a, adult; b, nymph. (After Osborn and Ball.)

Gypona octolineata Say.

Tettigonia octolineata Say. Jour. Phila. Acad. Nat. Sci. IV, p. 349, (1824).

Gypona octolineata Spangberg. Spec. Gyponae p. 8.

This is a large green species with dense reticulations over the entire elytra including the clavus and in some specimens the veins and cross veins are brilliant scarlet. There are eight fulvous stripes running from vertex across the pronotum. Length 8 to 10 mm.

One of the most generally distributed species occurring on a great variety of plants including grasses low herbage and bushes and trees.

Taken on birch July 22nd adult, birch and alder sweepings in woodland July 31 at Orono, North Harpswell Aug. 12th, Portland Aug. 13th, larva and Aug. 14th, Riverton Park, Highmoor Farm Aug. 15th, Mt. Katahdin Aug. 22nd, Houlton Aug. 24th, Fort Kent Aug. 28th.

The species has undoubtedly some economic importance as its larvae feed on many plants of value but they are so widely scattered that any very effective means of control seems doubtful. Where abundant on grasses or shrubbery sprays may be used and in some situations the burning of dead leaves would doubtless help.

Gypona flavilineata Fitch.

Gypona flavilineata Fitch. Homop. N. Y. State Cab. p. 57, (1851).

Similar to *octolineata* but without reticulations on the clavus, slightly larger and usually lighter colored. Length ♀ 10 mm. ♂ 9 mm.

This form indicated by Say as a variety of *octolineata* and later described as a distinct species by Fitch is difficult to separate if long series are in hand but there is hardly such complete gradation from one to the other, especially as represented in Maine, as to warrant absolute merging of the two forms into one species. Specimens of this form have been collected at Orono, Portland Aug. 13-14th, Highmoor Farm Aug. 15th. It is usually taken from trees and has not in any case I believe been collected from bogs. It is usually less abundant than *octolineata* and so far as observed hardly plentiful enough to be counted of much economic importance.

Gypona cana Burm.

Gypona cana Burmeister Gen. Ins. pl. 16 No. 10.

Gypona quebecensis Prov. Nat. Can. IV. 352 (nec V. D.)

Gypona cana Van D.

Light yellowish green with a slight bronzy tinge especially after drying. The elytra are only faintly reticulate at tip not at all on clavus or base of corium. Smaller than the other species known in Maine. Length ♀ body 7 mm. to tip of elytra 8-9 mm. ♂ body 6.5 mm. to tip of elytra 8 mm.

One specimen determined by Van Duzee bears date of Sept. 10, 1905, and specimens have been taken during 1913 at Orono Aug. 5th, Highmoor Farm on blueberry Aug. 15th, Grand Lake Stream Aug. 15th by Prof. A. P. Morse, Mt. Katahdin Aug. 22nd, Houlton Aug. 24th, Ft. Kent Aug. 28th. While specimens have been taken in a number of situations and from a variety of plants this species has appeared especially common in low ground and boggy places and a number were collected in the bog south of Orono and at Houlton on plants growing among the sphagnum. There are some puzzling variations in the amount of elytral reticulation but there seems to be a fairly constant general facies upon which one can separate this form from the others occurring in the state. One specimen, also referred to this species, (*quebecensis* Prov?) is smaller and darker green with very few reticulations at tip of elytra, taken from poplar July 30th at Orono.

Except for its occurrences on blueberry the species has not been noted in sufficient numbers on any plant of economic value to be counted injurious in any of the collections this season.

KEY TO GENERA OF JASSIDAE OCCURRING IN MAINE.

- A. Ocelli on vertex at or near margin and remote from eye
 - Acocephalina*
 - a. Head flattened with acute edge (less sharp in *albifrons* male)
 - Acocephalus*
 - aa. Head with vertex rounded to front, minute species about 3 mm.
 - Nestocephalus*

- AA. Ocelli on margin between vertex and front *Jassina*
- b. Inner sector of elytra twice forked three ante-apical cells in elytra.
- c. Head flattened, margin thin, acute, sometimes foliaceous. *Parabolocratrus*
- cc. Head margin usually angular or rounded not sharp edged or if so only on anterior portion.
- d. Elytra with two cross veins.
- e. Vertex produced and usually angled on border, front very long and narrow. *Platymetopius*
- ee. Vertex usually less angular, front broad, clypeus narrow at tip. *Deltocephalus*
- dd. Elytra with one cross vein between sectors. *Scaphoideus*
- ccc. Head broad usually blunt edged.
- f. Elytra usually short, seldom longer than abdomen, often very short and wings wanting.
- g. Head broad ovipositor short little if any longer than pygofer. *Athysanus*
- gg. Ovipositor long exceeding pygofer.
- h. Gray or with golden iridescence *Athysanella*
- hh. Black robust head very blunt. *Driatura*
- ff. Elytra usually long exceeding abdomen, mostly large species with short heads.
- i. Elytra with fine ramose lines not restricted to transverse band. *Phlepsius*
- ii. Elytra without ramose lines or if present restricted to cross band behind middle.
- j. Vertex with transverse furrow. *Eutettix*
- jj. Vertex without furrow
- k. Pronotum strongly curved in front, side very short *Thamnotettix*
- kk. Pronotum less curved nearly as long at side as at middle, side carina long. *Chlorotettix*
- bb. Inner sector not forked, two ante-apical cells in elytra. *Cicadulina*
1. Wing with 3 apical areoles *Cicadula*
- 1l. Wing with 2 apical areoles. *Balclutha*

Acocephalus striatus. (Linn.)*

This species has been one of the very abundant ones in Maine and its general occurrence in pastures and meadows, also grain fields and upon variety of other plants places it among those which must be counted of economic importance. The adult is quite variable. The females ranging from a light green or pale yellowish or straw color to nearly brown with

*The synonymy of this species is confused and I follow Van Duzee's Catalogue in the reference to Linnaeus.

numerous flecks of brown or black. The males are dark colored, or gray with a rather conspicuous yellowish band across the pronotum. They are somewhat smaller than the females and the angle of the head usually slightly more acute. The length of the female is about 6 mm, of the male 5mm.

Adults of this species are common during August and September and since well developed nymphs were quite plentiful in August it would appear that there was a spring deposition of eggs and that the nymphs developed during mid-summer, reaching maturity by August and the bulk of the individuals becoming mature the first of September. Whether they hibernate as adults or deposit eggs in autumn has not been determined.

The species is generally distributed over the state occurring wherever collections were made and it has been noted for New York so that it may be considered as occupying a considerable range of the northern part of the country. It is apparently identical with the European form but whether a recent introduction or simply a survival of the common distribution for northern countries of Europe and America dating back to an earlier geological period it seems impossible to say.

Apparently the most available treatment for this species would lie in the application of the hopper-dozer method, although if eggs are deposited in the stems of grass or other plants, where burning would be possible, the utilization of the burning method in late fall or early spring would probably give the best results. Rotation of crops would seem of little avail as the species has evidently a wide range of food plants and is doubtless able to fly readily from field to field in search of suitable food plants. A further study of the species to determine more exactly its mode of hibernation and the number of generations is desirable.

The results of life history studies on this species during the summer of 1914 will appear in a later bulletin.

Acoccephalus albifrons Linn.

Jassus mixtus Say. Van D. Catalogue, p. 288.

This is a dark species with the front light gray or whitish, the males with brown elytra often interrupted with whitish or semi-transparent spots.

Occurs in considerable abundance at a number of localities. Females were taken abundantly at Highmoor Farm in a lawn, but appeared only where there was some admixture of timothy, and did not appear where this grass was absent.

Orono Aug. 9th in meadow near Stillwater, Riverton Aug. 14th, Houlton Aug. 24 on grassy hillsides, Fort Fairfield Aug. 26.

Found abundantly in timothy meadows in summer work of 1914 and a study of its habits will appear in the bulletin on life histories.

Xestocephalus pulicarius Van Duzee.

Xestocephalus pulicarius Van Duzee. Buf. Soc. Nat. Sci. Bul. 5, 1894, p. 215.

A small dark brown species with light yellowish spots on prothorax and elytra. Length 2.5 mm.

This is somewhat infrequently taken but seems to occur pretty commonly in places where *Carex* grows and it is evidently fairly common on the food plant given by Van Duzee. *Carex vulpinoidea*.

Taken at Orono in the Orono bog, Aug. 29, at North Harpswell Aug. 13, Houlton Aug. 24th, Cherryfield Sept. 5th, 1913.

Xestocephalus fulvocapitatus Van Duzee.

Xestocephalus fulvocapitatus Van Duzee. Buf. Soc. Nat. Hist. Bull. V. 25, 1894.

Differs from *pulicarius* in being slightly larger the head fulvous and unmarked, the pronotum and elytra are brown faintly marked with lighter spots. Length 3 mm.

This species was separated from *pulicarius* by Van Duzee on the larger size and fulvous color of head and he says "in company with the preceding (*pulicarius*) of which it may prove to be a variety." It appears to be closely related and often found associated but material in hand will hardly warrant combining the two species as this form appears to maintain a fairly constant difference in different localities.

Specimens for Maine have been taken in company with *pulicarius* in the Bangor bog near Orono from *Carex* Aug. 31st.

Xestocephalus nigrifrons n sp.

Size and general structure of *fulvocapitatus* but mostly jet black, lower part of face including most of frons, black. Length female 3 mm.

Head rounded, nearly as wide as pronotum, ocelli near together and close to the front margin of the vertex; face tumid, polished, sutures obscure; pronotum rounded in front sloping to sides slightly excavated posteriorly.

Color black with a few white points, vertex black at base, brownish near apex, ocelli white with black central dot, face brown above, two transverse wavy lines on margin next vertex, rest of face polished black, pronotum and scutellum black, the latter with four white points, two at base and one each on hind border opposite the suture, elytral picture like *fulvocapitatus* but basal part black, two white dots on clavus, several on basal half, apical part semitransparent with smoky patch on apex. Beneath black, legs light brown.

Genitalia: Female ventral segment similar to *fulvocapitatus* but more distinctly notched at middle.

One specimen Orono, Maine, Aug. 10, 1913. This may possibly be a black variety of *fulvocapitatus* but it is widely different from any speci-

mens I have seen especially in the color of face. From *coronatus* O. & B. it differs in larger size and especially in color pattern of pronotum and elytra.

Parabolocratus major, n. sp.

Similar to *viridis* but larger, the vertex more broadly rounded and with the margins drawn out into a thinner edge, the anterior border of pronotum less distinctly arched; the elytra shorter, reaching only to base of pygofer in female. Color uniformly green, similar to *viridis* though usually a little lighter green, the black line under the margin of the head wanting in the females, the tip of elytra in males and of ovipositor in females tinged with light brown. Length of female 7.5 to 8 mm. and male 5.75 to 6 mm.

Head broad, anterior border broadly rounded, the margin very thin, length at center about three-fourths the width between eyes; occiput slightly concave, front only slightly convex, clypeus, parallel sides about one-fourth longer than wide, lorae narrow nearly reaching margin of cheek; pronotum about twice as wide as long, anterior border slightly arcuate between the eyes, hind border convex; elytra short, in female reaching base of pygofer, in male extending slightly beyond tip of abdomen; venation as in *viridis*.

Genitalia: Last ventral segment distinctly longer than preceding; hind border distinctly convex and sinuate, the pygofer with lower margin produced apically and distinctly though obtusely angled exceeded by the ovipositor by about one-fourth its length. Male valve very short sometimes hidden, plates narrowing shortly to about the middle and extended in slender upcurved acute points margined with fine cilia, the tips reaching the lower angle of pygofer which is produced dorsally appearing obliquely truncate in lateral view.

Specimens of this form have been taken at Orono 1913 and 1914, also at Castalia, Ohio July 27, 1900, Columbus Aug. 30, 1904, and a series of three females and four males at Steubenville, Ohio, Aug. 1904.

At Cedar Point, Ohio, 1910-1911 this form was taken both as nymphs and adults in considerable numbers on the swamp meadow grass *Calamagrostis canadensis* which appears therefore to be its normal food plant. This with the apparent constancy of the adult characters seems to confirm the definition as a distinct species, *viridis* where observed in larval form has occurred only on *Stipa spartea*.

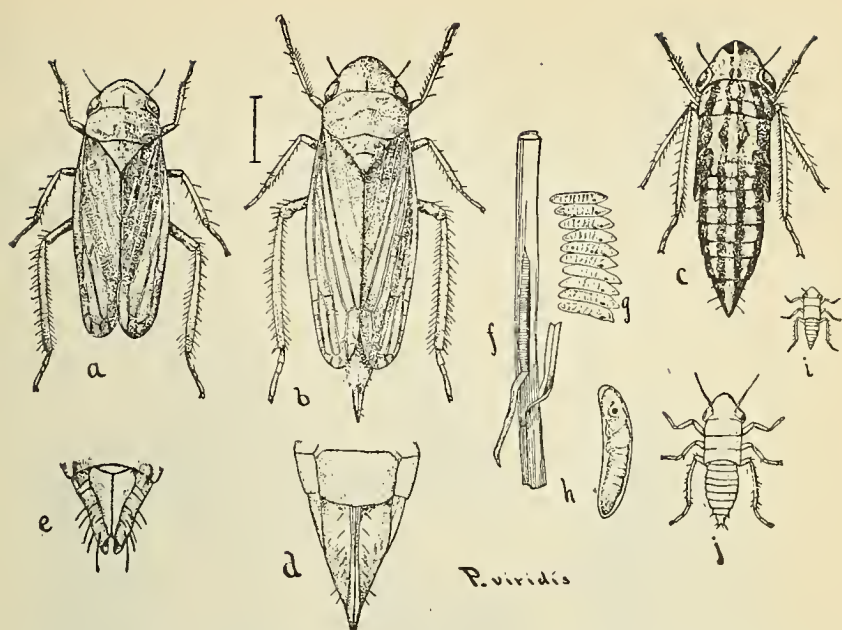


Fig. 19. *Parabolocratulus viridis*: a, Male; b, female; c, nymph; d, female genitalia; e, male genitalia; f, eggs in stem; g, eggs, enlarged; h, single egg, still more enlarged; i, j, young nymphs. All enlarged. (After Osborn and Ball.)

Platymetopius acutus Say.

Jassus acutus Say. Acad. Nat. Sci. Phila. Jour. VI. 306, 1831.

Platymetopius acutus Uhler U. S. Geol. & Geogr. Surv. Bull. 1877 III, 473.

Platymetopius acutus Osborn, Bulletin 108 Bur. Entom. U. S. Dept. Agriculture.

Head sharply pointed, vertex twice as long as width between eyes, face yellow with brown border, a white stripe parallel to edge of vertex, front very narrow and long. Color above brownish and fulvus, often with bronzy luster. Length 5 mm.

This species which occurs from the Atlantic to the Pacific is perhaps the most abundant species of the genus in Maine and as it has a wide range of food plants including a number of valuable cultivated crops, it is of economic importance. Specimens have been taken at Orono on a number of occasions between Aug. 1st and Sept. 5th, in most cases in adult stage. Also at Grand Lakes Stream Aug. 15th and 16th by Prof. A. P. Morse, at North Harpswell Aug. 12th, Portland Aug. 13th and 14th from bushes, grass and sweet fern, Highmoor Farm Aug. 15th from willows, potato and various plants, Mt. Katahdin Aug. 20-22 up to summit 5000 ft. elevation, Houlton Aug. 24th, Mars Hill Aug. 25th, Fort Kent Aug. 28th.

The larval form of this species has a characteristic black border running from the head along the sides to the last segment of the abdomen narrowing sometimes in the central part of the abdomen and the included area is yellow or in some cases bright red for the central part.

As the larvae are usually found in grass or weeds and low herbage along fences and roads it is probable that clean culture and the burning of leaves and litter where practicable will have a good effect in reducing the numbers.

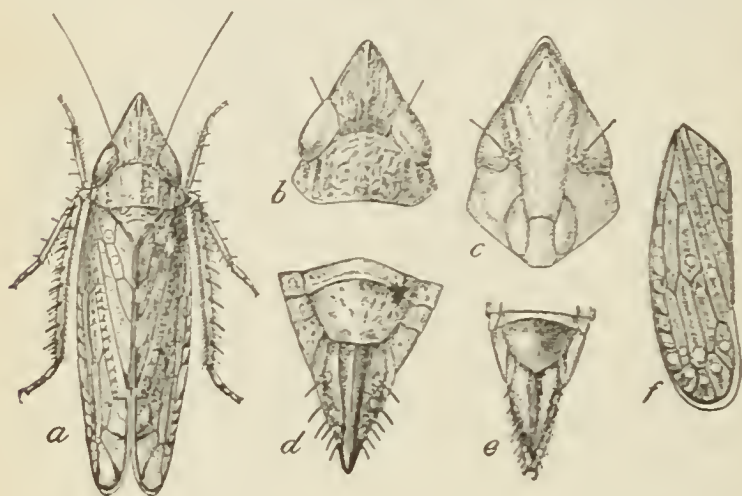


Fig. 20. The sharp-nosed leafhopper (*Platymetopius acutus*): a, Adult; b, vertex and pronotum; c, face; d, female genitalia; e, male genitalia; f, elytron. All enlarged. (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108.)

Platymetopius cuprascens Osborn.

Platymetopius cuprascens Osborn 20th Rept. N. Y. State Entomologist p. 517 (1905).

This species has the form of *acutus* in general but the vertex is longer and more acute, the face is entirely yellow without the brown border of *acutus* the last ventral segment of the female is long and has a distinct median carina on the posterior half. Length 5 mm.

A single specimen of this species was taken at Mars Hill Aug. 25th, also one specimen Ft. Kent Aug. 28th. These are exact duplicates of the type specimen which was collected by Mr. Van Duzee at Phoenicia, N. Y. Several females and males taken at Orono Aug. 5, 8, 11, 22, 24, 1914.

Male, form of female with elytra a trifle less flaring in the specimens in hand.

Vertex long, acutely pointed but scarcely as sharp as female.

Color, above blackish from crowded black or fuscous lines and dots. Light border of vertex and dots of elytra as in female, face greenish white in strong contrast to dark color above.

Genitalia,—valve very long two or three times length of preceding segment and nearly twice the length of the plates, subangularly rounded behind, central part with smooth yellow or spotted disk and dark spotted border, plates short, broad at base, outer edge strongly curved, the tips running into very short blunt spatulate processes and not reaching end of pygofer, surface with scattered short bristles.

One male taken in 1913 and several in 1914 associated with females in same ground evidently on same food plan but amongst mixed vegetation.

While these have not been found mating with *cupresceus* females the very striking similarity except in coloration and size, the fact that this form includes only males and the lighter cuprescent form only females and their association in a very restricted area leaves no reasonable doubt as to the connection.

Platymetopius frontalis Van Duzee.

Platymetopius frontalis Van Duzee Canad. Ent. XXII 112, (1890).

Platymetopius frontalis Osborn Bull. 108 Bur. Ent. U. S. Dept. Agriculture.

Dark brown or nearly black the face bright yellow on the central part with a distinct brown or black border. Vertex acute but shorter than in *acutus* much shorter in male. Length 4 mm.

This species has been recognized but once this season and this time only from a nymph collected at the Bangor bog on Aug. 5th. The species is common however in New York and New England and it seems certain that it must have a more general occurrence in the state. It ordinarily occurs in grass-land and is very frequently taken in adult form from oak trees.

The nymph is characterized by the broad black margin of prothorax and abdomen enclosing a bright yellow stripe extending from head to tip of abdomen.

Platymetopius magdalenensis Prov.

Platymetopius magdalenensis Provancher Faun. Ent. Can. p. 275 (1 spm.).

Platymetopius obscurus Osborn Ohio Nat. V, 274 (1905).

Platymetopius obscurus Van Duzee Annals Ent. Soc. Am. III, p. 229.

Similar to *acutus* but with the face distinctly brown. Length 5 mm.

This species is common to a large section of the eastern U. S., but apparently restricted locally to low ground or boggy situations. It was taken at the Bangor bog, near Orono Aug. 5, 1913 at N. Harpswell Aug. 12, 1913 where it was taken mainly if not entirely from blueberry clumps and the leaves of these plants showed much spotting and deadening evidently from these or other leafhoppers.

Associated with this species in some instances but often occurring as well marked forms by themselves is a lighter variety, the upper surface and face having a bright cinnamon brown color. As other characters seem to relate it here and as the nymphs are decidedly different from those of *acutus* I will call them tentatively var. *cinnamomeus*. In one instance a ♀ *magdalensis* was found in copulation with ♂ of the variety *cinnamomeus* which would strengthen the view that these forms are varietal. This variety has been taken almost exclusively from bog plants and was especially abundant in the Bangor bog, near Orono, large numbers being collected there Aug. 5 and 30, 1913 and again in July 1914. Other localities are Mt. Katahdin, Houlton and Ft. Kent.

The adult forms are 4.5-4.75 mm., the males 4 mm. in length.

As these forms occur abundantly in blueberry patches it is probable that they are among the injurious species affecting this crop.

They are probably destroyed in the burning over of the patches and where this is practiced regularly it will keep them in check.

Platymetopius angustatus Osborn.

20th Rept. N. Y. State Entomologist p. 518 (1905).

This species is small light olive green and the female is 5 mm. long, the male slightly smaller.

A single specimen of female was taken by Mr. C. P. Alexander at Fryeburg Sept. 5th, 1913.

Scaphoideus jucundus Uhler.

Md. Acad. Sci. Trans. Vol. 1, p. 34 (1889).

Several specimens of this handsome species were taken by Mr. C. P. Alexander at Fryeburg Sept. 5th, 1913.

Scaphoideus scalaris Van Duzee.

Scaphoideus scalaris Van Duzee. Entom. Amer. VI, 51.

Scaphoideus scalaris Osborn. Cinc. Soc. Nat. Hist. Jour. XIX, p. 198, (1900).

Gray brown, the cross veins of elytra dark, those of the costa not strongly oblique. Smaller and lighter colored than *lobatus* and without the orange crossband on vertex of *auronitens*. Length 5 mm.

This species is apparently quite rare in Maine as it has been taken at only a few localities, Orono Aug. 13th, 14th, Houlton Aug. 24, Mars Hill Aug. 25th, and Fort Fairfield Aug. 26th, in each instance but one or two specimens. One record is "on blueberry."

Scaphoideus lobatus Van Duzee.

Scaphoideus lobatus Van Duzee, Bul. Soc. Nat. Hist. Bull. V 100, (1892). Osborn Cincinnati Soc. Nat. Hist. Jour. XIX, p. 199, (1900).

This species has something of the appearance of a *Phicpsus* but the head is more pointed and with a sharp edge. The white ground is

marked with fine black lines and dots and there is a series of three ivory white spots along the commissure of the elytra. Length 6 mm.

This is a rather rare species wherever it has been taken and its range runs from Maine to Iowa; but it has occurred in Maine this season only at a few points. I took two specimens at Riverton Park near Portland on Aug. 14th, and Mr. Alexander secured one at Houlton Aug. 24th. Its food plant is unknown but it occurs on grassy hillsides in mixed vegetation.

Scaphoideus auronitens Prov.

Scaphoideus auronitens Provancher Pet. Faun. Canad. III, 277 (1889).

Scaphoideus auronitens Osborn Cinc. Soc. Nat. Hist. XIX, 194, (1900).

Light brownish with golden luster and with a clear orange cross band on the vertex and dark veins to elytra. Length 6 mm.

Evidently rather rare in the state or else its food plant has not been commonly met. Three specimens were secured at Riverton Park near Portland Aug. 14th, and it was taken at Fort Kent Aug. 28th. It has been found in both adult and larval forms in New York on *Geranium robertsonianum* and occurs only in shaded wooded places.

The larva has been described in my report on the Jassidæ of N. Y.

While an interesting species and one which may be looked for anywhere in Maine that its food plant occurs it can not be counted of economic importance.

Scaphoideus carinatus Osborn.

Scaphoideus carinatus Osborn. Jour. Cinc. Soc. N. H. XIX, p. 201, (1900).

This is a large light gray species with a distinctly carinate female ventral segment. Length female, 6.5 mm.

A specimen of this species taken at Orono Aug. 5, 1913. As in other places this species seems to occur in great rarity, but this may be due to its occurrence upon some obscure plant or under such conditions as to escape collection.

Scaphoideus productus Osborn.

Scaphoideus productus Osborn. Jour. Cinc. Soc. Nat. Hist. Vol. XIX, p. 200, (1900).

This species is larger than *immistus* and heretofore has been recorded only from the Mississippi valley. The specimens collected in Maine at Orono in August of 1913 and 1914 are covered well by the description of the species and while they seem to differ a little in general facies and some minor details from the types in my collection the differences seem too slight to warrant separation as a distinct species. It has been swept from blueberry and I have taken nymphs which may belong here from blueberry clumps but never with such restriction as to demonstrate their dependence upon this plant.

Scaphoideus luteolus Van Duzee.

Scaphoideus luteolus Van D. Bull. Buf. Soc. N. H. V, p. 210.

This species is close to *immistus* but usually lighter colored and there is a distinction in the male genitalia which is usually a fairly certain means of distinction. The specimens in hand are all males and represent collections at Orono, N. Harpswell, and Ft. Kent in Aug. 1913. The species is evidently much less abundant than *immistus*.

Scaphoideus immistus Say.

Jassus immistus Say. Acad. Nat. Sci. Phila. Jour. VI. 306. (1831).

Scaphoideus immistus Uhler. Md. Acad. Sci. Tr. I. 33 (1889).

Scaphoideus immistus Osborn. Cinc. Soc. Nat. Sci. XIX 204.

Whitish with dark markings, the head with a conspicuous cross band on the vertex. Cross veins at end of costal space very oblique and conspicuous. Length 5 to 6 mm.

As elsewhere throughout a large part of northern United States this is the most abundant and generally distributed *Scaphoideus* in Maine. It occurs usually on or adjacent to willows and the variety common in this state is probably developed on this plant or vegetation associated with it. In other regions it seems to be much more variable but this would suggest the possibility that there are in reality several closely related species feeding on different plants but too much alike in appearance to be separated where they occur together.

The species has been taken at Westbrook (Stover); Orono Aug. 2nd and 5th, adults, and North Harpswell Aug. 12th, Portland Aug. 13th and 14th, Highmoor Farm Aug. 15th, Mt. Katahdin Aug. 22nd, Houlton Aug. 24th and Ft. Kent Aug. 28th.

Its occurrence upon plants of slight commercial value renders it of little economic importance and it may be ignored in this respect.

Deltocephalus productus Walker.

Jassus productus Walker. List Homop. Ins. Brit. Mus. III, 891, (1858).

Deltocephalus bilineatus Gillette and Baker, Hemip. Colo. p. 85.

This species has a distinctly acute head, the basis of Walker's name *productus*, and there are two fulvus or brownish stripes across the pronotum and on base of vertex changing to black at the center and followed by two black triangular spots that reach the front border converging to the tip. General color light gray or straw with fuscous spots in the apical cells of the elytra. Length 4 mm.

This species seems to have been very rare especially in the eastern part of the country as after the description by Walker it was not recorded till the discovery by Gillette and Baker in Colorado. I have one specimen taken in Ohio and a specimen collected by Dr. C. M. Weed at Hanover, N. H. I collected one specimen at Mar's Hill Aug. 25th on the summit of the hill, also one specimen, Orono Aug. 1914. It doubtless occurs on some kind of grass or sedge but the particular species is unknown.

Deltocephalus sayi (Fitch).

Amblycephalus sayi Fitch. Homop. N. Y. State Cab. 1851.

Deltocephalus sayi Osborn & Ball, P. I. Acad. Sci. 1897.

A short rather robust species dark brown to blackish with distinct transverse bands on vertex and a fairly distinct band across elytra. Length 2.5 to 3 mm.

Abundant in meadows and grass lands generally. July 25 to Aug. 29th at Orono, N. Harpswell August 12, common, Portland August 13, common, Portland (Riverton Park) August 14, common, Highmoor Farm August 15, common, Mt. Katahdin August 21, up to table land, 4500 ft., Houlton August 24, Mar's Hill August 25, Ft. Fairfield August 26, Phair August 26, Ft. Kent August 28, Mt. Desert Island August 31, on Dry Mt.

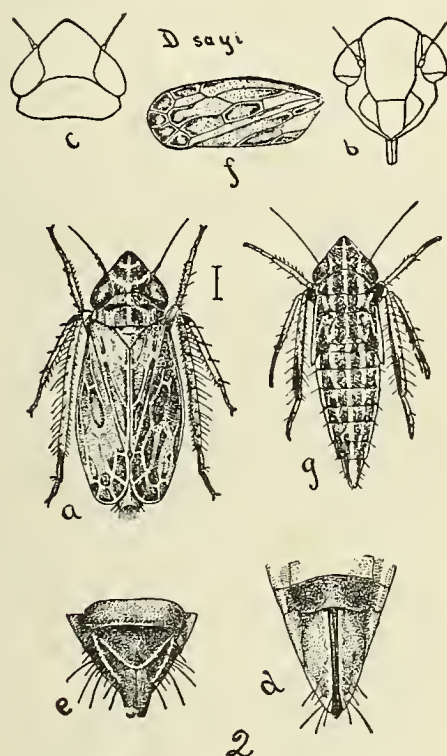


Fig. 21. Say's leafhopper (*Deltocephalus sayi*): a, Adult; b, face; c, vertex and pronotum; d, female genitalia; e, male genitalia; f, wing; g, nymph. All enlarged. (After Osborn and Ball.)

Deltocephalus misellus Ball.

Deltocephalus misellus Ball Canad. Ent. XXXI, p. 191.

This is quite similar to *sayi* but a little smaller and usually slightly lighter in color. It occurs commonly on Canadian blue grass and has been taken at Orono in both 1913 and 1914 in sufficient abundance so that it may be considered of some economic importance.

Deltocephalus obtectus O. & B.

Deltocephalus obtectus Osborn and Ball. Davenport Acad. Nat. Sci. VII, p. 78.

This species is about the size of *misellus* but with quite distinct reticulations on the clavus. Length 2.5-3 mm.

This was taken at Kittery June 26th, 1914, and the species does not appear to be common or widely distributed in the state.

Deltocephalus infumatus n. sp.

Small dark brownish or smoky with light veins on the elytra. Length ♀ 2.5 mm., ♂ 3 mm.

Vertex rather broad subangulate and slightly conical in front, twice as long at middle as next the eye and slightly broader than middle length. Front broad, narrowing from below the antennae to base of clypeus. Clypeus distinctly narrowed at tip, lorae rather narrow and long but not reaching border of base, pronotum very short at sides; scutellum very small; elytra in female short, reaching only to base of pygofer, apical cells very much reduced.

Color: vertex, pronotum, except hind margin, scutellum, cross veins and elytra mostly dull brown. The vertex with an indented transverse double spot, scutellum with dark cross, elytra with whitish cross veins, the costal and apical portion whitish. Legs with tibiae and spines brownish, cheeks with brownish spot on the side, exterior border of face brownish.

Genitalia: Female last ventral segment scarcely longer than preceding, hind border with shallow notches on either side of a narrow middle tooth. Pygofer broad with short bristles at tip. Male—valve short, broadly rounded or very faintly angulate at the middle. Plates broad, rather short, margins upturned, disc polished, tips reaching scarcely to tip of pygofer.

Described from a number of specimens taken at Orono, Maine, July 3rd, 9th, 1914, also taken at Orono, Houlton, Van Buren and Ft. Kent in 1913. This species is about the size of *obtectus*, but has distinct markings and the sooty black color is a distinction.

This species agrees very closely with specimens I have from Edinburgh, Scotland, which answer quite well the description of *D. pulicaris* Fall.

Deltocephalus minki Fieb.

Deltocephalus minki Fieb. Verh. Zool. Bot. Ges. in Wien. 1869.

Deltocephalus minki Fieb. Van Duzee "Catalogue," Tr. Am. Ent. Soc. XXI, p. 292.

Light straw yellow above, dark, often black below, the head obtusely pointed. Length 3 to 4 mm.

A very abundant species in meadows and along roadsides apparently not restricted to any species of grass but possibly more common on blue grass. Adults abundant July 28th, 29th. A few nymphs.

At this season and for many of the fields near Orono this species seems to replace *inimicus* in importance. Adults appear in collections for Orono, common in meadow, Aug. 5 and 9, No. Harpswell Aug. 12, meadow, Portland Aug. 13, meadow, not abundant, adults, Houlton Aug. 24, grass land, low ground, Van Buren Aug. 27, Ft. Kent Aug. 28. Also quite abundant during the season of 1914.

Deltocephalus sylvestris Osborn and Ball

Deltocephalus sylvestris O. & B. Iowa Acad. Sci. Proc. IV, 213.

This is a small slender species a little larger than *melsheimeri* with the head a little less pointed and the elytra faintly marked. Length 3-3.5 mm.

Collected at Orono July 31st, Aug. 2nd, Highmoor Farm Aug. 15th, Grand Lakes Stream Aug. 16, Princeton Aug. 16th, Mt. Katahdin, 1000-1500 ft., Aug. 20-22, Houlton Aug. 24th, Kineo Aug. 17th, Fort Kent Aug. 28th.

This species is usually found in or near woods and upon annual grasses.

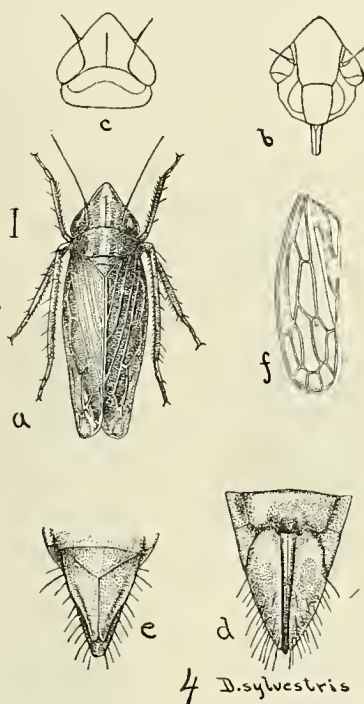


Fig. 22. *D. sylvestris*: a, adult; b, face; c, vertex and pronotum; d, female; e, male genitalia. (After Osborn and Ball.)

Deltocephalus melsheimeri Fitch.

Amblycephalus melsheimeri Fitch. Homop. N. Y. State Cab., p. 61, 1851.

Deltocephalus melsheimeri Osborn, Rept. N. Y. Entomologist, 1904, p. 521.

A very small and slender species with sharply pointed head pallid color and very narrow black border on central part of female segment. Length 2.5-3 mm.

This is usually abundant on its particular host plant, *Danthonio spicata*, and has been collected this season (1913) at Orono, Mt. Katahdin, Aug. 22, 600, 1000, 1500, 1900 ft., Houlton Aug. 25th, Fort Kent Aug. 28th.

Deltocephalus apicatus Osborn.

Deltocephalus apicatus Osborn. Can. Ent. XXXII, p. 285.

Light brown with the head and apex of elytra light yellow. Length 2.5 to 3 mm.

Has been taken in a number of meadows around Orono July 29 to August 7. Only adults being seen.

Its usual food plant (*Panicum huæchuchæ*) has been recognized in practically all places where it has been taken.

Plenty in field near Stillwater Aug. 9 in patches of *Panicum huæchuchæ*, Veazie August 6, Houlton August 24, abundant in meadow, N. Harpswell, plenty in meadow with *Panicum*, Portland Aug. 14th, common, Highmoor Farm Aug. 15th, pasture, common.

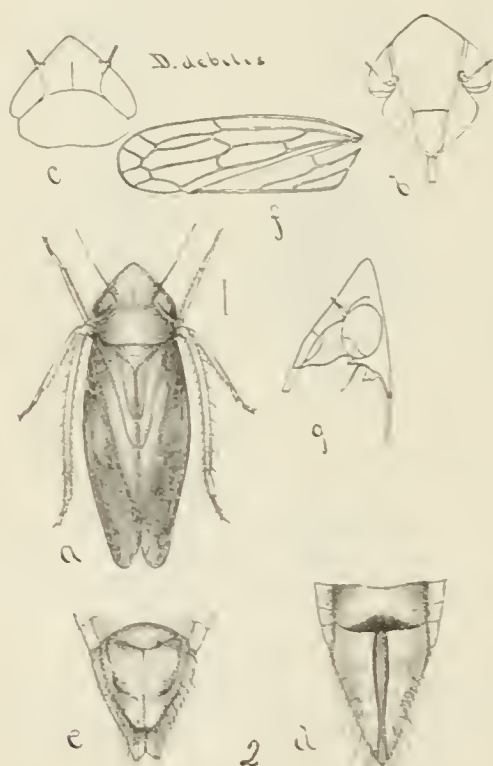


Fig. 23. *D. debilis*: a, adult; b, face; c, vertex and pronotum; d, female; e, male, genitalia; f, elytron; g, side view head. (After Osborn and Ball.)

Deltocephalus debilis Uhler.

Deltocephalus debilis Uhler. U. S. Geol. and Geog. Sur. Bul.

Light grass green above, below darker, especially the frontal arcs, but without the solid black of *abdominalis* which it approaches very closely in many characters. Length 4 to 4.5 mm.

Specimens referred here were taken at Orono, August 5, 1913.

Deltocephalus abdominalis Fab.

Deltocephalus abdominalis Fab. Syst. Rhyng, p. 98, 61.

A rather large grass green species with the upper part of the face intensely black, the lower central part light yellow, the abdomen black, except margins of segments and sides of ovipositor. Much like *debilis* but slightly larger and distinguished by the black color on the face and underside of abdomen. Length 5 mm.

This species occurring in northern Europe and America is a common species along our northern border and in Maine specimens have been taken at Houlton Aug. 24th, Fort Fairfield Aug. 25th, and Fort Kent Aug. 28th, as it feeds in grass and wheat and occasionally appears in large numbers it must be counted injurious.

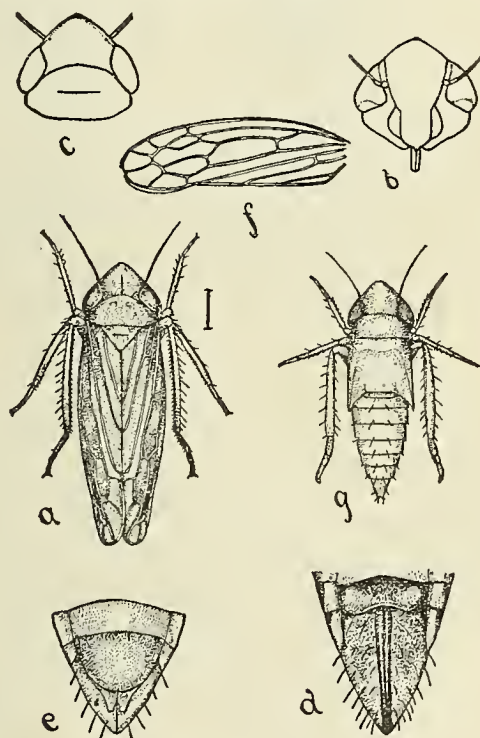


Fig. 24. *Deltocephalus affinis*: a, Adult; b, face; c, vertex and pronotum; d, female genitalia; e, male genitalia; f, wing; g, nymph. All enlarged. (After Osborn and Ball.)

Deltocephalus affinis Gillette and Baker.

Deltocephalus melsheimeri Van Duzee, Am. Ent. Soc. Trans. XXI, 292.

Deltocephalus affinis Gillette and Baker, Hemip. Colo. p. 84.

Light gray, faintly marked, the head obtusely angled and broad, the elytra sometimes faintly marked with fuscous. Larger and with much blunter head than *melsheimeri*. Length 4 mm.

While this is a common and at times an extremely abundant species in states farther west it has been taken very sparingly in Maine and evidently does not occupy an important economic place. Our specimens were secured at Orono June 18th and 19th and I took it at Portland Aug. 13th, Highmoor Farm Aug. 15, 1913. Also at Elliott and Kittery June 26, 1914.

Deltocephalus nigrifrons Forbes.

Deltocephalus nigrifrons Forbes, 14th Rept. Ill. State Entomologist, p. 67, (1884).

Deltocephalus nigrifrons Osborn and Ball. Pr. Ia. Acad. Sc., IV, p. 218, (1897).

Light gray or yellowish above, the face almost entirely black by coalescence of frontal black arcs and sutural lines. A row of black dots bordering the front of the vertex and turning down in front of the eyes. Elytral veins often bordered with fuscous but the color varies greatly in intensity. Length 5 mm.

This species which often swarms in immense numbers in oats, wheat and annual grasses over a large part of the country must be exceptionally rare in Maine as only a single specimen has come to light each season, these being collected at Orono Sept. 12, 1913, and July 6, 1914. They are of the typical dark form and marking with the facial lines dark and the elytral markings well defined.

Deltocephalus configuratus Uhler.

Deltocephalus configuratus Uhler. U. S. Geol. and Geog. Sur. Bull. 1871, 4 : 511.

Deltocephalus configuratus Van Duzee. Buf. Soc. Nat. His. Bul. 4 : 198.

Deltocephalus configuratus Osborn and Ball. Pr. Ia. Acad. Sci. Vol. IV, p. 209 (1897).

Light ashy gray, the head with two darker transverse bands and the last ventral segment with a black polished central spur. Length ♂ 4 mm. ♀ 4.5-5 mm.

Quite abundant in timothy meadows and grassland at Orono as adults, Aug. 5 to 29th, N. Harpswell Aug. 12, common in meadow and pasture, Portland Aug. 13, common in meadow near salt marsh, Portland (River-ton Pk.) Aug. 14, common in meadow, Highmoor Farm Aug. 15, common in meadow and pasture, Mt. Katahdin Aug. 21, 1913, on tableland 4500 ft.

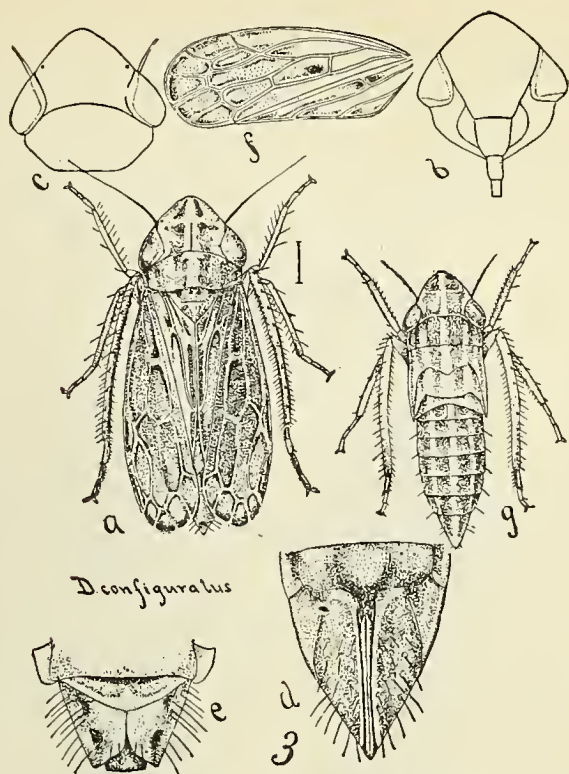


Fig. 25. *Deltocephalus configuratus*: a, Adult; b, face; c, vertex and pronotum; d, female genitalia; e, male genitalia; f, wing; g, nymph. All enlarged. (After Osborn and Ball.)

THE DESTRUCTIVE LEAFHOPPER.

Deltocephalus inimicus Say.

Jassus inimicus Say. Jour. Acad. Nat. Sci. Phila. VI, p. 305, (1831).

Deltocephalus inimicus Osborn and Ball. Pr. Ia. Acad. Sci. IV, 215 (1897).

This species which is so serious a pest in grasslands and occasionally in wheat and oats in the south and west, especially in some parts of the Mississippi valley is one of the common species in Maine but for the past season it was not taken in such an abundance as to indicate as great an economic importance as in some other localities.

It is a small gray species with three pairs of round black dots,—one pair on the head, another on the prothorax and a third on the scutellum. The claval cells are reticulate with brown or blackish squares. Length 5 mm.

The larvae of this species are quite distinctly marked after the first moult. A black border passes from behind the eyes to near the tip of

the abdomen, the rest of the body being light yellow or whitish. There are for more southern localities and probably for Maine at least two distinct broods each summer and winter is passed in the egg stage.

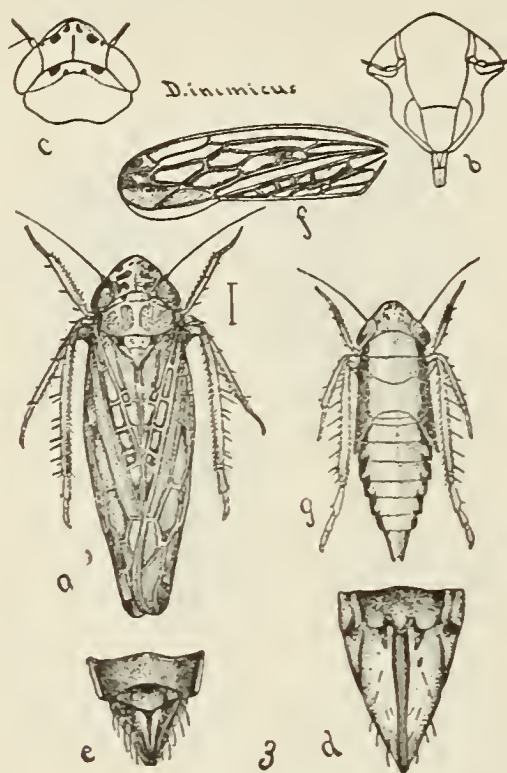


Fig. 26. The inimical leafhopper (*Deltocephalus inimicus*): a, Adult; b, face; c, vertex and pronotum; d, female genitalia; e, male genitalia; f, elytron; g, nymph. All enlarged. (After Osborn and Ball.)

Eggs hatch in early spring and the young of the first generation reach their maturity the later part of June, and the eggs deposited by adults of this generation hatch in a short time and the young develop during mid-summer and reach maturity by August or early September. Their development is irregular enough so that considerable numbers of nymphs and adults may be found at any time during the summer and early autumn but ordinarily adults are only found in late fall or early winter and it appears quite certain all deposited eggs before winter and that the winter is passed then in the egg stage. How far this life cycle will apply to the condition in Maine it is somewhat difficult to say but from the abundance of well developed nymphs and adults in late August and early September it seems probable that the two generations are produced about as in the latitude of Iowa and New York.

The range of food plants in this species is considerable but it seems to favor blue grass as its first choice of food plant and the distribution of the species is apparently quite in agreement with the distribution

of this grass. According to observations mapped in Bulletin 108 the southern line of distribution runs into Kentucky and Tennessee, and northward to include a part of Colorado and the northwestern states to Washington. All of which is included in the general distribution of blue grass while to the south of this where the sod grasses do not reach, this species of leafhopper has not been observed. In Maine it is less abundant and its place seems to be occupied in considerable part by *D. miuki*, and *misellus* and *Athysanella acuticauda*, all of which are com-

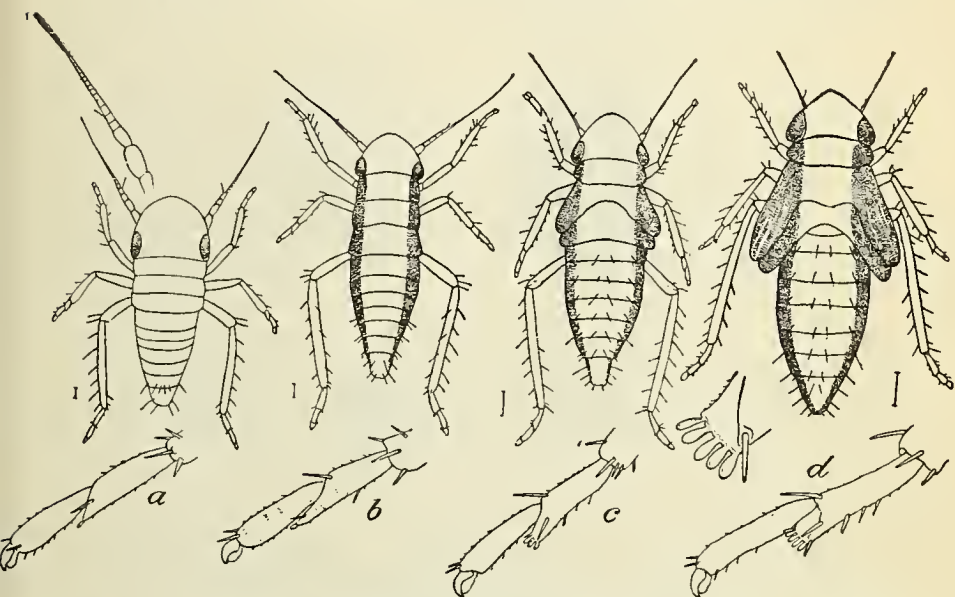


Fig. 27. The inimical leafhopper (*Deltocephalus inimicus*): Nymphal stages; a, newly hatched; b, c, d, later stages, the details of tarsal appendages shown below. All enlarged. (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108).

mon in the vicinity of blue grass and especially on Canadian blue grass.

The measures of treatment for the species that are the most available would seem to be the burning of the grasslands where practicable in late fall or early spring. This measure not only applies to *inimicus* but to the related forms occurring in the same locality.

Athysanus curtisii, Fitch.

Athysanus curtisii Fitch. Homop. N. Y. State Cab. p. 61, 1861.

Athysanus curtisii Osborn, Bull. 108 Bur. Ent. U. S. Dep. Ag.

This is a small species with yellow and black stripes and two large round black spots on the vertex. Length 3 mm.

Usually an abundant species in grassy woodland but has been very seldom seen this season and when collected it has been in rather open pastures and meadows. It may be a rather rare species in the state and if so has no economic significance.

It was taken at Orono on the University grounds July 28th and Sept. 5th, and I took a few specimens at Fort Kent on Aug. 29th, but it was evidently quite scarce. While somewhat more common in 1914 it was in no place found in abundance.

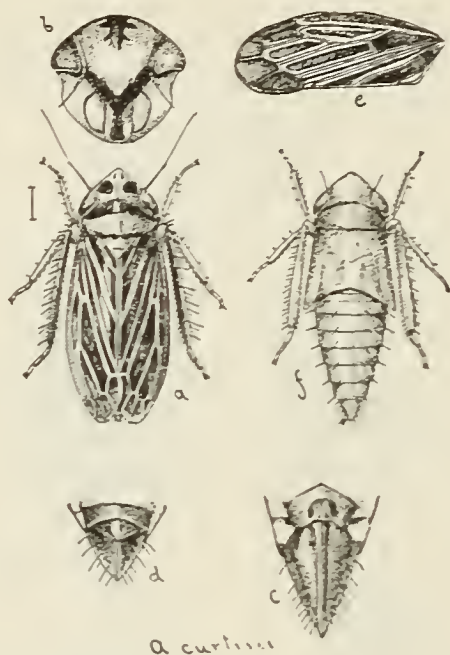


Fig. 28. *Athysanus curtisii*: a, Adult; b, face; c, female genitalia; d, male genitalia; e, elytron; f, nymph. (After Osborn and Ball.)

Athysanus anthracinus Van Duzee.

Athysanus anthracinus Van Duzee Can. Ent. Vol. 26. p. 136, 1894.

Athysanus anthracinus Osborn and Ball Ohio Naturalist II. 241.

A black shining species with rather blunt pointed head with tips of femora and the fore and middle tibiae yellow or white. Length 4 mm.

This has been taken in small numbers at Orono July 30th and 31st in woods pasture and Aug. 5th in meadow. July 11, 1914, nymphs and adults in grass,—roadside and fence row.

Athysanus plutonius Uhl.

Athysanus plutonius Uhler U. S. Geol. Survey Bul. 3. 1877.

Athysanus plutonius Osborn and Ball Ohio Naturalist, II. 240.

Closely related to *anthracinus* but usually lighter brown or dull blackish with faint yellow lines on head and thorax and the head more sharply angled than in that species.

One specimen is in the Experiment Station collection determined by Van Duzee, collected at Orono July 26, 1905. I took it at Portland in meadow Aug. 13th-14th, at Mt. Katahdin on tableland Aug. 21st at 4500 feet elevation, at Fort Kent Aug. 28th and Kineo Aug. 17.

Athysanus obsoletus Kirschbaum.

Athysanus obsoletus Kirschbaum. Die Athysanus Arten v. Wiesbaden, p. 7, 1858.

Athysanus obsoletus Van Duzee. Buf. Soc. Nat. Hist. Bull. V, p. 199.

Athysanus obsoletus Osborn and Ball. Ohio Naturalist II, p. 239.

Pale straw color with obsolete or faint markings. Head bluntly angulate. Smaller and lighter colored than *extrusus* which it resembles pretty closely. The male pygofer is short and do not extend beyond plates and have only short teeth instead of style like appendages. Length 4 mm.

This species is common in North America and Europe but is distinctly a northern form occurring in the northern U. S. and Canada. Specimens have been taken in Maine at Orono in timothy meadow Aug. 1st and 2nd, at Van Buren Aug. 27 and at Houlton Aug. 24th. It is hardly plentiful enough to be counted of economic importance. It was more common in collections made July and Aug., 1914 at Orono in timothy meadows.

Athysanus extrusus Van Duzee.

Athysanus extrusus Van Duzee Canad. Entom. XXV, 283, 1893.

A gray brown species with yellowish indefinite markings, short wings hardly reaching the end of the abdomen and with a rather short protruding ovipositor. Length 5 mm.

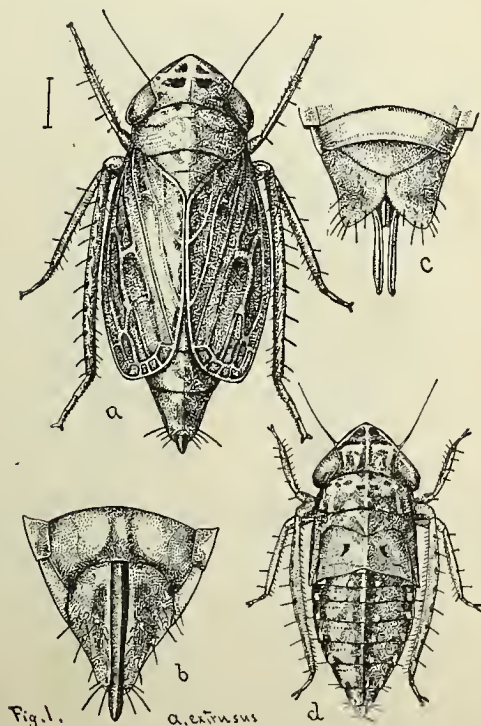


Fig. 29. *Athysanus extrusus*: a, adult; b, female, c, male, genitalia; d, nymph. (After Osborn and Ball.)

This species has nowhere occurred in any large numbers but it has been taken at a number of different points and is evidently pretty generally distributed over the state. Taken in low ground timothy meadow Aug. 2 and 5th at Orono, Grand Lakes Stream by Prof. A. P. Morse Aug. 16th, North Harpswell Aug. 12th, Fort Kent Aug. 26th.

It is hardly abundant enough to be counted destructive but since it occurs in pastures and meadows and as a grass feeder it must be to the extent of its abundance an injurious species.

Athysanus striatulus Fallen.

Cicada striatulus Fall Hem. Succ. II, 45, 1826.

Athysanus instabilis Van Duzee. Can. Ent. XXV, 284, 1893.

Athysanus striatulus Osborn and Ball. Ohio Naturalist II, 242.

This species is of the size and form of *vaccinii*, which it quite closely resembles, but it is of a dark brown color and without tawny tinge, the legs dark, femora twice annulate with pale. Length female 4.5, male 4 mm. Width 1 mm.

This species occurs in boggy and swampy places and has been taken at a number of points in Maine, sometimes occurring in considerable abundance but its food plants are commonly the species that occur in wet lands and except for blueberry have comparatively little economic value. The larvae have been taken in bog Aug. 5th.

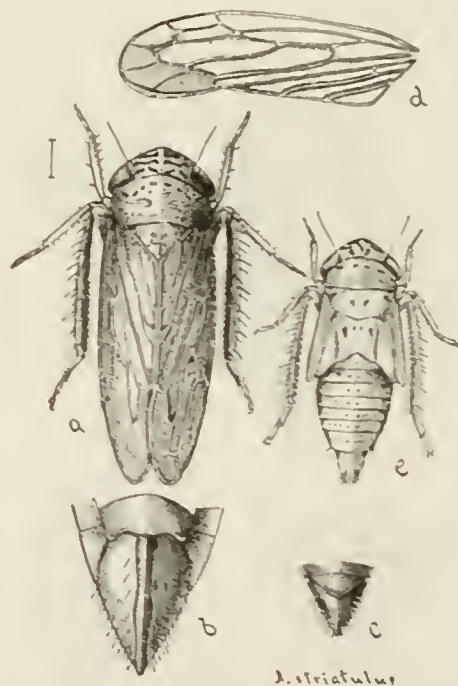


Fig. 30. *Athysanus striatulus*: a, adult; b, female; c, male genitalia; d, elytron; e, nymph. (After Osborn and Ball.)

Athysanus arctostaphyli Ball.

Athysanus arctostaphyli Ball. Entom. News Vol. X, p. 172 (1899).

Athysanus arctostaphyli Osborn and Ball. Ohio Naturalist 11, 243.

Smaller than *vaccinii* which it resembles in form and color pattern. Maine specimens are darker, almost black, the light portions of the head and elytra much reduced. Length ♀ 3.5 mm ♂ 3 mm.

This species was taken on Mt. Katahdin at levels of 4700 and 5000 ft. Two specimens were taken at level of 4750 by Mr. C. P. Alexander and I secured one additional specimen at Ft. Kent. The Katahdin specimens are darker and the fuscous markings more confused than in Colorado or Mt. Washington (N. H.) specimens but there seems no sufficient basis to consider them distinct. The Ft. Kent specimen from a much lower level than the Katahdin specimens is a trifle nearer in distinctness of markings to the Colorado specimens. All are smaller than the type specimens from Colorado but agree quite closely with a series that I have from Mt. Washington, N. H.

Athysanus elongatus n sp.

Similar in color and markings to *arctostaphyli* but much more elongated. Black with yellow or whitish lines and dots. Elytra much longer than the abdomen. Length ♀ 4.5 mm. ♂ 3.25 mm., to tip of elytra.

Head produced, distinctly angulate, one-half longer at middle than next the eye but length at middle less than half the width between the eyes; pronotum strongly arched in front slightly emarginate behind; elytra long, apical cells long and entirely beyond the tip of abdomen.

Color:—black, ocelli red, ring around the ocellus, oblique and median lines meeting at the apex, two round spots back of ocelli and two short elongately triangular transverse spots between them on vertex, yellow; numerous minute irrorations on pronotum, four central dots and four marginal dots on scutellum, yellowish white; veins of elytra and central part of areoles whitish or subhyaline; front black, with small whitish arcs; clypeus with two basal spots and lorae with submarginal spot whitish the four forming a transverse row; median line of front and sutures faintly whitish; apex and subapical spot on femora whitish as are the bristles of the tibiae.

Genitalia: Female last ventral segment equal to preceding, truncate. Male valve short rounded behind; plates narrow three times as long as valve, pointed at tip, narrowly ciliate.

Except for the extreme difference in form this species might be considered as a very long form of *arctostaphyli*. Specimens were taken at Orono, Maine, July 3rd, 1914; Mt. Katahdin at 4700 and 5000 ft. Aug. 21st; Portland Aug. 13th, Cherryfield on blueberry Sept. 5th, Ft. Kent Aug. 29, 1913. A specimen was collected by Prof. H. G. Barber, Mt. Katahdin Aug. 19th, 1902 and he has also sent me a specimen labeled "Dilley Ore," which evidently belongs here though the latter, with one specimen taken at Mt. Katahdin between 1000 and 1500 ft. have the spots on the face larger and yellowish spots on side of last ventral segment and pygofer of female.

Athysanus angustatus n. sp.

Narrow, smaller than *elongatus* equally slender, black with yellow markings, elytra mostly whitish. Length ♀ 4 mm. ♂ 3.25 mm. to tip of elytra.

Head subangulate in front, one-third longer at middle than next eye, about one-third as long at middle as width between the eyes; pronotum arched before, truncate behind, lateral margin very short; elytra long, apical areoles entirely beyond the tip of the abdomen.

Color black, the hind border of vertex and front border of pronotum with irregular yellow spots; scutellum with outer angles yellowish, leaving middle of stripe black; elytra yellowish hyaline, veins whitish bordered with faint fuscous, more evident in males; face black the frontal arcs, most of the cheeks, two large spots on clypeus and a large central spot on lora, yellow; fore and middle femora black on basal half, apical half and tibiae, also hind femora, except narrow black line, yellow; thorax black; venter black, margin yellow, pygofer of female orange yellow; tergum black.

Genitalia: Female last ventral segment slightly longer than the preceding, truncate; male valve small, short, rounded behind; plates narrowed to blunt points, about three and one-half times as long as valve.

This species appears to belong in the *striatulus* group though in some respects it approaches *striola* and would doubtless be included in *Limotettix* as defined by Edwards. Specimens were taken at Orono Aug. 1st. Kineo Aug. 17th, Mt. Katahdin at levels of 1000, 4500 and 4700 ft. Aug. 21, 1913. I have also two specimens kindly given me by Mr. E. P. Van Duzee which he collected at Lake Placid, N. Y. Aug. 12, 1904.

Athysanus vaccinii Van Duzee.

Athysanus striatulus Fall (Fall) (?) (*vaccinii* nov.) Van Duzee Entom. Amer. VI, 134, 1890.

Athysanus vaccinii Osborn and Ball, Ohio Naturalist II, 242.

This species is quite similar to *striatulus* and occurring in similar situations is likely to be confused with that species. It is lighter colored somewhat tawny in tinge especially in front, olive testaceous above and blackish below, the tips of the fore and middle femora and all the tibiae orange. Length female 4.5 mm, male 4mm, width 1 mm.

This is an especially common species in boggy places and may be taken in immense numbers in almost any of the wild low ground that is supplied with a rank growth of blueberries and other bog loving species. It was described as an inhabitant of the cranberry from New Jersey but evidently has a wide range of food plants and while it must be counted injurious when feeding on blueberries, cranberries or other valuable plants it undoubtedly lives in large part on plants of no economic value. Collections have been made at Orono July 18, '05, North Harpswell Aug. 12th, Portland Aug. 13th, For: Ken: Aug. 28th, Highmoor Farm pasture Aug. 15th by myself and at Grand Lakes Stream Aug. 1st, by A. P. Morse.

Athysanus humidus n sp.

Light rusty brown usually unicolorous in females, male with fuscous or blackish markings. Length ♀ 3.60 mm ♂ 2.75 mm.

Head angulate, vertex two-thirds longer at middle than next the eye, about two-thirds as long as width between the eyes; Pronotum short, slightly emarginate behind; elytra slightly exceeding the abdomen.

Color: Female light rusty brown, unicolorous, the elytra a shade lighter than the head or subhyaline, with veins faintly whitish. Below uniformly rusty brown except tibial spurs which are darker. Male as in female or slightly darker but with faint irrorations on pronotum and borders of elytral veins fuscous; sutures of face, and the venter and tergum, black; the last ventral segment except median spot and the valve and plates brown.

Described from numerous specimens collected in the Bangor bog near Orono Aug. 5 and 31 and in a bog near Houlton Aug. 24, 1913.

This species especially the males suggest characteristics of *vaccinii* and it seems probable that it is derived from the same stock. These

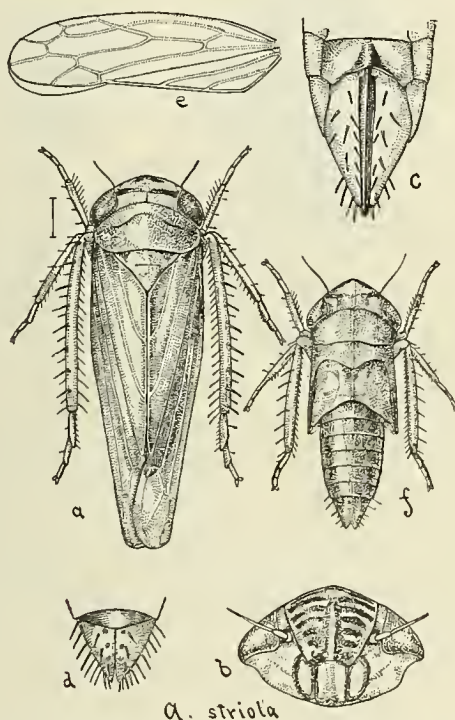


Fig. 31. *Athysanus striola*: a, adult; b, face; c, female, d, male genitalia; e, elytron; f, nymph. (After Osborn and Ball.)

with the group of *striatulus*, *arctostaphyli*, *elongatus* and *angustatus* constitute a group of rather variable forms that have most probably all diverged from a common stem. This species however has never been taken outside of distinctly bog conditions and seems to favor the satu-

rated locations supporting an abundant growth of sphagnum. It appears to be similar to the European *russeolus*, which I have not seen, but the description indicates a quite different detail in marking.

♂, *Athysanus striola* Fallen.

Cicada striola Fallen. Acta Holm. XXVII, 31, 1806.

Athysanus striola Osborn and Ball. Ohio Naturalist II, p. 235.

This is a rather large species very broad in front and tapering sharply to end of wings, yellowish green with a broad black band across the face just below the margin of the vertex.

It occurs only in low ground on coarse grasses, possibly also on sedges and I have never seen it in such numbers as to warrant calling it of much economic importance. It has been taken at Orono Aug. 2nd when it was swept from grasses in low boggy ground among clumps of alder, birch, etc., at Cherryfield Aug. 8, (Wm. Woods), at Mt. Katahdin at the summit 5300 ft. and at Fort Kent Aug. 28th.

Athysanella acuticauda Baker.

Athysanella acuticauda Baker.

A short winged gray species with two conspicuous black round spots on the front of the head. The female ovipositor is much extended and pointed and with the abdomen gives the insect a sharp-wedged appearance. Length, female 4 mm. male 3 mm.

This species occurs in immense numbers in rather dry locations especially in upland pastures and meadows on the dwarf grasses to which they seem especially well adapted in coloration and habit. It seems particularly to frequent Canadian blue grass. A long-winged specimen of this species taken at Orono Aug. 8, 1914, shows close similarity to *Athysanus* venation.

Abundant at Orono Aug. 29th, North Harpswell Aug. 12th, Portland Aug. 13th-14th, Highmoor Farm Aug. 15th, Mt. Katahdin Aug. 21st on tableland 4500 ft., Fort Kent Aug. 28th and will undoubtedly be found in all parts of the state in suitable situations.

Driatura gammaroidea Van Duzee.

Athysanus gammaroidea Van Duzee. Buf. Soc. Nat. Hist. Bul. Vol. V, p. 209, 1894.

Driatura gammaroidea Osborn and Ball. Dav. Acad. Nat. Sci. Proc. VII, 89.

This is a peculiar looking species quite black with a wide vertex very short wings and a long, sharply pointed ovipositor. Length, ♂ 3 mm ♀ 4 mm.

The species was originally described from Kansas but later taken in Iowa and then in New York and the collection of the species at Portland this summer two specimens from roadside grasses Aug. 14th near Riverton Park extends its range considerably farther east. It is quite

possible it may be found farther north or east but it is seldom plenty, does not fly and is not very easily observed so it will be difficult to state its limits of distribution till more extended collecting has been done. It is too scarce to be counted of any economic importance.

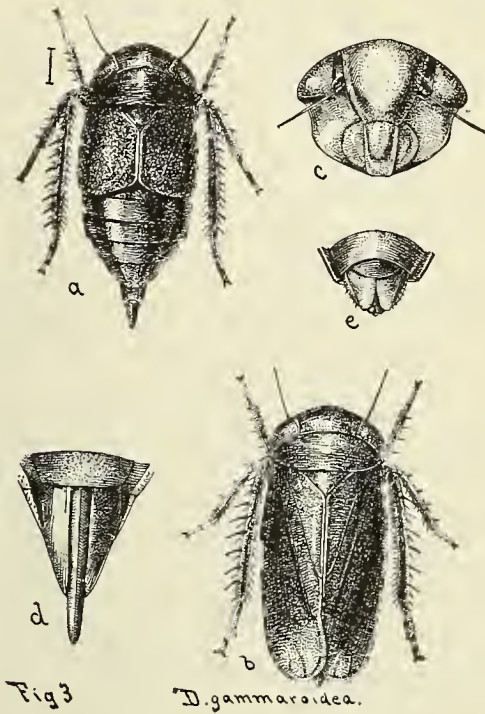


Fig. 32. *Driatura gammaroidea*: a, adult, short winged; b, long winged; c, face; d, female, e, male, genitalia. (After Osborn and Ball.)

Thamnotettix waldana Ball.

Thamnotettix waldana Ball. Canad. Ent. Vol. XXXV, p. 229, 1903.

A single female specimen referred to this species collected at Ft. Kent Aug. 28th, 1913. Dr. Ball's specimens were taken in Colorado, but this specimen agrees very perfectly with his description and notwithstanding the fact that the geographical range is so greatly extended I feel confident in the identification.

Thamnotettix eburata Van Duzee.

Thamnotettix eburata Van D. Canad. Ent. XXI, p. 10, 1889.

This species is similar to *clitellarius* but larger and there are no spots on the front and the pronotum is entirely brown. Length 6 mm.

A specimen of this species kindly loaned to me by Mr. C. W. Johnson of the Boston Society of Natural History is labelled Fort Kent, Me. and bears date of Aug. 19th, 1910. Doubtful records are Orono Aug. 1, 1913 and Fryeburg Sept. '13 (C. P. Alexander), Mt. Katahdin Aug. 22, '13.

THE SADDLE-BACKED LEAFHOPPER.

Thamnotettix clitellarius Say.

Jassus clitellarius Say. Jour. Acad. Nat. Sci. Phil. VI, 309, 1831. Complete Writings II, 384, 1869.

This widely distributed species is to be recognized by the conspicuous saddle-shaped yellow spot on the back, when the wings are closed, with a rich chocolate brown color varied with yellow on front of head across pronotum and along the front borders of the wing. Length 5-5.5 mm.

The species while of very general occurrence is never noted as very abundant and need not be counted as of probable economic importance. It occurs in the undergrowth of thickets and woodland but has not been determined as restricted to any one food plant.

It has been collected at Orono as adults July 29th and Aug. 7th, at Portland Aug. 13th.

KENNICOTT'S LEAFHOPPER.

Thamnotettix kennicotti Uhl.

Thamnotettix kennicotti Uhler. Proc. Am. Ent. Soc. II, 161, 1863.

This is a large and rather striking species of rich brown color and with two conspicuous black spots on margin of the head. Length 6.5-7 mm.

It occurs generally through the eastern U. S., but in Maine I have taken it only at N. Harpswell where it was beaten from bushes in a pine grove, and at Mar's Hill Aug. 25th. A specimen in the Bost. Soc. N. H. from Ft. Kent carries its distribution to the extreme northern part of the state.

Thamnotettix cockerelli Ball.

Brown above with minute flecks of blood red on head and pronotum and on veins of elytra. Length 5.4 mm.

This species was described from Colorado but specimens collected in some numbers on *Salix rostrata* at Fort Kent agree so closely with the description that they are referred here. Specimens in hand also, from Cherryfield Sept. 5, 1913 (Wm. Woods), and Orono Aug. 15th, 1914.

Thamnotettix morsei n sp.

Similar to *cockerelli* but with two black spots on front close to vertex. Minutely flecked with crimson dots. Length 5.25 mm.

Vertex slightly longer at middle than next eye, front narrowing sharply to clypeus. Clypeus nearly twice as long as wide, slightly enlarged at tip.

Color: Yellow brown; face, vertex, pronotum and scutellum with minute red flecks which on elytral veins merge into lines. Beneath yellow.

Genitalia; male valve short, rounded behind, plates broad at base, narrowed at middle with slender acuminate tips that reach tip of pygofer.

Described from two males one collected at Grand Lakes Stream by Prof. A. P. Morse, Aug. 16, 1913, the other at Orono on willows Aug. 25, 1913.

Aside from the two spots on front it differs from *cockerelli* in the genital plates.

Thamnotettix rufescens n sp.

Brown with reddish suffusion and conspicuous red eyes. Length 5 mm. Vertex one-half longer at middle than next eye, front with nearly parallel sides to below eye, narrowing abruptly to clypeus; clypeus widening toward tip. Pronotum uniformly rounded in front, sub-emarginate behind.

Color, light brown with coppery reflections, eyes red, elytra semi-transparent, metallic, venter black, last ventral segment and genitalia brown.

Genitalia,—Male. Valve narrower than plates, rounded subangular behind; plates wide, roundly narrowed at near acuminate tip; finely ciliate.

One specimen Fort Fairfield Aug. 26, 1913.

Thamnotettix belli Uhl.

Jassus belli, Uhler, U. S. Geol. Survey Bull. III, 471, 1877.

Thamnotettix belli Van Duzee, Psyche VI, 306.

This a small light yellow species with oblique lines on the elytra and a distinct yellow band across head and pronotum. Two small round black spots on front next vertex. Length, 5 mm.

This is a western species described from Colorado and apparently common there. Van Duzee gives its distribution as Colorado, Canada, Mich., and in my New York list a single specimen was referred to this species though not agreeing entirely with western specimens. Three specimens collected at Orono by Mr. Shaw June 6th, July 7th and 18th extends its distribution into Maine and shows that it occurs early in the summer and one of the specimens is marked from "Hazel." These specimens agree well with Colorado specimens in my collection. Also Mt. Katahdin 3000 ft. Aug. '02 (Barber).

Thamnotettix belli var *brunneus* n var.

Similar to *belli* in size and form and in female genitalia but without the black spots of vertex and with no yellow band on pronotum or yellow lines on elytra. Length 5 mm.

Head as in *belli* roundly subangular in front about one-third longer at middle than next the eye.

Color rich brown, vertex yellow in front and brown on posterior half, face yellow, tinged with brown with two conspicuous black round spots close together and close to the border of vertex; pronotum, scutellum and elytra solid brown with no traces of yellow lines, the elytra becoming semi-transparent at apex. Beneath yellow with the last ventral segment and pygofer brown.

Genitalia: female, last ventral segment long, evenly rounded and simple on hinder border.

This form has been taken on several occasions and does not seem to show any intergradation with *belli* in color pattern but it agrees so closely in genitalia and in size and form that until males or a larger series of individuals is in hand it seems best to consider it as simply a variety. Specimens have been taken at Orono July 8th and 29th, 1913 and July 3rd, 1914.

Thamnotettix chlamydatus Prov.

Athybanus chlamydatus Prov. Pet. Faune Ent. Can. III, p. 339 (1890).

Thamnotettix infuscata Gillette and Baker. Hemip. Colo. 98.

Thamnotettix punctiscuta Gillette and Baker. Hemip. Colo. p. 99.

Brownish with a greenish olive tinge especially when fresh. Scutellum with two distinct dark spots. Length 5.5 mm.

This was fairly common at Orono being taken on several occasions June 3 and 30, July 7, 8, 9, 29, Aug. 1 and 7 and at Mt. Katahdin Aug. 22. Some of the specimens were swept from birch and hazel and the latter particularly seems likely to be its food plant.

This species was described from Canada and Colorado and has been recorded from Sault Ste Marie, Mich., Lake Placid, New York in the Adirondacks, and these records for Maine gives it a considerably wider range though still limited to the distinctly northern fauna.

Thamnotettix melanogaster Prov.

Jassus melanogaster Provancher Naturaliste Canadienne IV. 378. (1872).

Thamnotettix melanogaster Prov. Pet. Faun. Canad. III. 284. (1890).

Bright yellow, often tinged with orange, the border of the vertex with four distinct black spots in a row; venter black as also the tergum of abdomen. Length 5 mm.

This is a quite common species in low ground occurring on coarse grasses and sedges. It was taken at Orono Aug. 2, North Harpswell Aug. 12th, Mt. Katahdin Aug. 22nd and at Ft. Kent Aug. 28th. It is occasionally found in sufficient abundance to be counted injurious to the grasses on which it occurs.

Thamnotettix decipiens Prov.

Thamnotettix smithi Van Duzee Can. Ent. XXIV, p. 266, (1892).

Thamnotettix decipiens Provancher Pet. Faun. Canad. III, 285, (1890).

This species is recognized by the black band running between the eyes at upper border of front close to margin of vertex. Length 5 mm.

Specimens from Ft. Kent referred here are a little larger than described by Van Duzee but agree well with Iowa specimens. They were taken Aug. 28th as adults. The larvae not recognized.

Greenish yellow with distinct veins, the dots on the vertex arranged two on the front border and one each side a little behind the border near the eye. Length 5 mm.

This is a very common species on coarse grasses and sedges in lowland and marshy ground especially in the northern part of the state. Mt. Katahdin Aug. 20-21, Houlton Aug. 24. Plenty in sedgy low spots among willow clumps, Mars Hill Aug. 25, few in low spots among sedges in spite of cold wind. Ft. Fairfield Aug. 26th, Phair Aug. 26th, Van Buren Aug. 27th, Ft. Kent Aug. 28th, sedges, Orono at the Bangor bog Aug. 30th on sedges, larva and adult, mostly adults and quite plenty.

Where the foodplants of the species have any economic value this species may be counted injurious as it occurs in sufficient numbers to cause damage.

Thamnotettix inornata Van Duzee.

Thamnotettix inornata Van Duzee Am. Ent. Soc. Trans. XIX, 303, (1892).

Light yellow and without spots or markings, otherwise is similar to *melanogaster*, though usually of lighter yellow color. Length 5.25 mm.

This has not appeared very frequently in the collections of the summer and always in small numbers. Orono Aug. 2, swept from low ground grasses and sedges, Mt. Katahdin Aug. 22.

Thamnotettix fitchi Van Duzee.

Thamnotettix fitchi Van D. Ent. Am. VI, p. 133, (1890).

Similar to *melanogaster* but smaller with four squarish spots on front border of head encroaching on vertex, wings pale brown with yellow veins. Length 4-5 mm.

The specimens referred to this species collected at Orono July 3, 8, 9 and 15, 1914 lack the parallel light lines usually present on the pronotum but in other characters I find no satisfactory basis for separation.

The species has occurred here only in limited numbers and upon coarse grass in low or moist spots in pastures and its economic importance may be considered as negligible.

Thamnotettix ciliata Osborn.

Thamnotettix ciliata Osborn. Proc. Iowa Acad. Sci. V, 244, (1898).

Slender light green with no conspicuous markings above, the veins of elytra faint, beneath light yellow or whitish, a black spot on each side of the last ventral segment of the female. Length 5-5.5 mm.

Apparently a rather rare species in the state as only two specimens have appeared in the collections of the season, taken at Orono on Aug. 2nd in a timothy meadow in a low spot probably including some sedges.

As this species was described from specimens taken in Iowa and has not hitherto been recorded for any point further east it is a rather interesting matter to find it at such a distance and to extend the range of the species by so large a jump.

Thamnotettix placidus Osborn.

Thamnotettix placidus Osborn. Report State Entomologist N. Y. 20th (1905) p. 536.

This is a bright yellow species with more orange tint than the related species and with no black markings above except the tergum and with the underside dark yellow except for black tip of beak and a series of black points on the middle of the venter. Length 5 mm.

This species was described from specimens taken at Lake Placid in the Adirondacks and it is interesting to record its collection at Orono Aug. 7th and Aug. 13th, thus giving it a considerably wider distribution. It was swept from coarse grass among willow clumps. Its restricted distribution and small numbers make it of little economic interest.

Eutettix strobi Fitch.

Bythoscopus strobi Fitch Homop. N. Y. State Cab. p. 58, 1851.

Phlepsius strobi Van Duzee. Ent. Soc. Trans. XXI, 249.

Eutettix strobi Ball. Dav. Acad. Nat. Sci. XII. p. 44. (1907).

This is a medium sized species, light brown with a tint of rosy, fine lines on the pronotum and elytra but not clearly irrorate, the head subangulate, a trifle longer at the middle than next the eye and with a faint transverse furrow. Length, 5-5.25 mm.

While described from pine the larvae have been found to feed on lambs quarters (*Chenopodium*) which makes its economic importance slight.

It has occurred but very rarely in the summers collecting, once at Orono when it was swept from birch and again at Ft. Fairfield where it was collected from bushes in a fence row. It is evidently of too rare occurrence to be of economic importance in the state even if its food plant were of value.

Eutettix subaenea Van Duzee var.?

Several specimens collected by Mr. C. P. Alexander at Fryeburg Sept. 5, 1913, fall in this species as defined by Ball, but will constitute perhaps a distinct variety as they do not agree precisely with any of the forms he has described. They come near *marmorata* or *lurida* but have prominent black spots on head.

Eutettix johnsoni Van Duzee.

Eutettix johnsoni Van Duzee. Canad. Ent. XXVI, 137, (1894).

This is a handsome little species golden yellow in color with whitish semitransparent spots on the wings and with a row of conspicuous black spots bordering the front next the vertex. Length, 5 mm.

While never appearing in any abundance it has been taken at a number of localities in the state and may be considered as quite generally distributed. At Orono it was taken sweeping in woods on mixed herbage around alder and birch clumps, Aug. —. Along roadside and from scrub oak Aug. 5th and at Veazie Aug. 6th; North Harpswell Aug. 12th, in open woods; Portland Aug. 14th at Riverton Park in open woodland and in most of these cases it has been adjacent to oak.

The species is too rare to be counted of economic importance and so far as can be determined concerning its food plant it does not attack anything of value.

Eutettix vitellinus Fitch.

Accephalus vitellinus Fitch. Homop. N. Y. State Cab. 1851, p. 57, reprinted in Lintner. 9th Rep't, 1893, p. 397.

Eutettix (Parcmesus) vitellinus Ball. The Genus *Eutettix* Proc. Davenport Acad. Sci. Vol. XII, p. 67 (1905.)

This large and handsome species is of a bright yellow color with whitish transparent spots and some light brown shadings on the pronotum and elytra on the latter forming an oblique band.

But few specimens have been taken and it may be concluded that the species occurs rather sparingly although pretty generally distributed. It has been taken at Orono from pine July 29, poplar July 30, North Harpswell in pine woods August 12, Highmoor Farm Aug. 15, Houlton Aug. 24, Mars Hill Aug. 25, on lower part of the hill and up about half way to summit, Ft. Fairfield Aug. 26, Ft. Kent Aug. 28.

THE IRRORATE LEAFHOPPER.

Phlepsius irroratus Say.

Jassus irroratus Say. Acad. Nat. Sci. Phila. Jour. VI, 308, 1891.

Phlepsius irroratus Van Duzee. Ent. Am. VI, 93, 1890.

Dark fuscous gray with numerous close irrorations the last ventral segment of the female with toothed margin. Length 6-7 mm.

This is one of the most abundant and widely distributed species of the genus throughout the eastern U. S., but it seems to be confined in Maine to the southern and ^{we}eastern portion of the state. To the north it appears to be replaced by *apertus*.

One specimen taken at Orono in pasture July 31st, Portland Aug. 14th, Highmoor Farm Aug. 15th, Mt. Katahdin Aug. 22, 1913, and an adult male at Orono on *Cornus* July 24, 1914.

While distinctly an economic species in some parts of the country it would appear from the scarcity and limited occurrence in Maine that it may be disregarded in this respect.

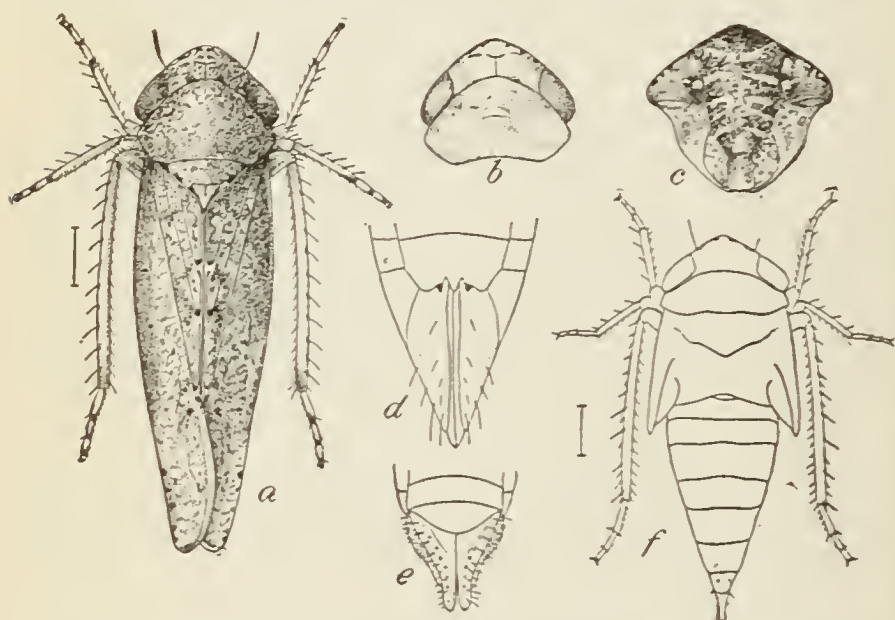


Fig. 33. The irrorate leafhopper (*Phlepsius irroratus*): a, Adult; b, vertex and pronotum; c, face; d, female genitalia; e, male genitalia; f, nymph from specimen taken at Toledo, Ohio. All enlarged. (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108.)

Phlepsius apertus Van Duzee.

Phlepsius apertus Van Duzee. Am. Entom. Soc. Trans. XIX, 76, (1892).

This is about the size and much the appearance of *irroratus*, dark gray in color distinctly irrorate but with a more distinct pale band across the elytra near the base. It is most positively known by the wide deep excavation of the middle part of the last ventral segment of the female. Length 6 mm.

The species seems to replace *irroratus* throughout the northern part of the state, especially where *irroratus* is rare or in some localities apparently wanting. It was taken in fair numbers at the base of Mt. Katahdin Aug. 22nd and in abundance at Houlton Aug. 24th, Mars Hill Aug. 25th,

Ft. Fairfield Aug. 26th and Ft. Kent Aug. 28th and 29th. At the latter place it was especially abundant in pastures and meadow lands and would seem to have the same economic importance that *irroratus* has in the Mississippi valley.

The larval form has not been determined but will pretty certainly be found in the grasslands where the adults occur.

Phlepsius maculellus n sp.

Approaching *maculatus* in general appearance but sufficiently different to make reference to that species uncertain. Head short. Dark maculations rather coarse. Length 6 mm.

Head as wide as pronotum, slightly produced but little longer at middle than next the eye, faintly subangulate; vertex sloping, with a faint transverse impression, rounded to the front; front broad, slightly tumid, narrowing uniformly to base of clypeus; clypeus widening to tip, one-half longer than wide. Pronotum strongly arched anteriorly, slightly concave on hind margin.

Color, light brown marked with fuscous, the head, pronotum and scutellum light brown with minute fuscous irrorations; front densely irrorate with fine lines and dots; elytra maculate, white, with large spots and ramose lines of fuscous.

Genitalia, male valve broad nearly as wide as preceding segment, hind border obtusely angular, plates very broad and short, width and length about equal, outer border strongly curved and the margin set with a close row of short hairs.

One specimen, male, taken at Orono Aug. 5, 1913 in boggy lowland. While this species has some resemblance to *maculatus*, which was described from female only, the agreement is not close enough to warrant reference to that species. It is possibly the male of some described species but until it can be definitely related to the proper form it had better stand under a separate name.

Phlepsius decorus O. and B.

Phlepsius decorus Osborn and Ball. Proc. Iowa Acad. Sci. IV, 230, (1897).

A broad dark gray species with rather conspicuous light markings on pronotum and along inner border of elytra. Length, 5 mm.

This species was described from specimens taken in Iowa and it has since been taken in Iowa and New York and Ohio but not in New England. It was a matter of interest therefore to find it in Maine and as a few specimens were taken at the base of Mt. Katahdin on the river at mouth of Abol stream and a specimen at Mars Hill half way up the mountain, it carries its distribution well to the northeast. It lives in wet places on sedge or coarse grass and at Mt. Katahdin was taken from rank growth along the river bank and at Mars Hill in a little patch of sedge marking what was evidently a springy place in the side

hill but which at the time of my visit was quite dry. The species has no economic importance and may be ignored in this respect unless it becomes far more abundant than it has appeared at any point yet.

Phlepsius fulvidorsum Fitch.

Jassus fulvidorsum Fitch. Homop. N. Y. State Cab. p. 62, 1851.

Phlepsius fulvidorsum Van Duzee. Am. Ent. Soc. Trans. XIX, 74, p. 11, Fig. 10 (1892).

This is easily separated from all the species but *collitus* by the light fulvous color of the head and pronotum. The head is distinctly longer at the middle than next the eye and angular instead of rounded. The elytra are dark fuscous closely irrorate. Length 6 mm.

This is rather a common species in the northeastern part of the United States but has usually been taken in the vicinity of conifers and Van Duzee says "always on hemlock, spruce, or pines." It has been taken in considerable numbers the present season (1913) and often on other plants than conifers though never far distant from some of the various species that are so universally distributed through the state. However, it has been so frequently taken on blueberry and in rough pasture land that I doubt if it is confined to the conifers, especially in the larval stages. The following records show its wide distribution in the state and the range of plants. Orono on birch and strawberry July 22, in blueberry patches and on pine and hemlock July 29th. Sweeping near birch and alder clumps July 31st. In Bangor bog Aug. 5th, Black Cap Mt. Aug. 6th, North Harpswell Aug. 12th. Common in woods including juniper and other conifers and blueberry. Portland Aug. 14th in grass near woods, Highmoor Farm Aug. 15th, on blueberry and other bog plants, Grand Lakes Stream Aug. 15th, (A. P. Morse) Mt. Katahdin, up to 3000 ft. Aug. 20-22, Houlton Aug. 24th on blueberry in bog, Bar Harbor on Dry Mt. near summit Aug. 31, also taken in Aug. 1914.

From its frequent occurrence on blueberry I conclude that it must be one of the species that cause the many discolored spots on the leaves of the plant and in several instances these were so common as to be worthy of consideration as of economic importance.

Phlepsius collitus Ball.

Phlepsius collitus Ball. Canad. Ent. Vol. XXXV, p. 227 (1903).

This species closely resembles *fulvidorsum* but the vertex is shorter and the elytral markings more distinct. Length 5 to 6 mm.

Specimens have been taken at Orono in limited numbers Aug. 5, 14 and 23, 1913 and July 3rd, 1914. They were swept from low herbage near alder clumps and one specimen is marked "Alder" but I think it is more probably dependent on some other plant for its development.

Phlepsius incisus Van Duzee.

Phlepsius incisus Van D. Trans. Am. Ent. Soc. XIX, p. 72, 1892.

Two specimens of this species one ♀ collected at Orono Aug. 7, and the other ♂, Portland Aug. 14, 1913. In the latter specimen the plates are more acute than usual but I believe it is properly referred here.

Phlepsius humidus Van Duzee.

Phlepsius humidus Van D. Trans. Am. Ent. Soc. XIX p. 288, 1892.

Specimens collected at Highmoor Farm Aug. 15th and 16th, 1913.

The species is characterized by broad body and sharp edged vertex and is one of the largest species occurring in the state. Length 7-7.5 mm.

Phlepsius franconiana Ball.

Phlepsius franconiana Ball. Canadian Entomologist, Vol. XXXV, 1903, p. 228.

I have taken one specimen, female, of what is evidently this species, at Orono July 3, 1914. It has very much the appearance of *Eutettix strobi* and indeed in some points especially the "three white bands" on elytra it fits Fitch's description better than the form assigned to that species.

As the female has not been described I may give the essential characters here. The vertex is distinctly angled, as much so as in *fulvidorsum* and slightly upturned at tip with a sharp edge, twice as long at middle as next the eye. The color agrees with Ball's description but there are but three instead of "four white points in a triangle" at apex of scutellum and the light bands of elytra are apparently wider being pearly white and including some fine ramose lines while the black points are mostly confined to the brown bands. The last ventral segment is twice the length of the preceding, produced at middle with shallow indentations each side and blunt lobes laterally. Length 6 mm.

This species has the vertex of *fulvidorsum* and nearly the color pattern of *apertus* but the bands are strikingly transverse in which it is very different from *strobi*. As compared with that species the second white band is just in front of the apex of clavus instead of just behind it.

The species is evidently rare as Ball described it from a single male and but one female has been taken here. It was taken at margin of woods which included pine and other conifers as well as a mixture of other plants.

Chlorotettix galbanata Van Duzee.

Chlorotettix galbanata Van Duzee Psyche VI, 310.

Yellowish green or whitish green when fresh, fading to a dull straw color, the head rounded in front, slightly produced, about one-fourth longer at middle than next the eye, the last ventral segment of female deeply cleft. Length 6 mm.

A single specimen taken at Portland Aug. 13th is the basis for our record this being taken from grass in or near the salt marsh at tide level. In this specimen the last ventral segment is cleft entirely to base and the inner margins of the resulting lobes are nearly parallel, the inner angles right angled, but unless these slight differences should be found constant in a full series it would not suffice to separate it as distinct. The species has been found abundant in Ohio and may be an economic species but it must be infrequent in Maine and needs no economic discussion at present.

Chlorotettix unicolor Fitch.

Bythoscopus unicolor Fitch. Homop. N. Y. State Cab. p. 58, 1851.

Athysanus unicolor Southwick. Science XIX, 288, 1892.

Chlorotettix unicolor Van Duzee. Psyche, VI, 306, 308, 1892.

Light green, the wings hyaline, head broadly rounded and wider than pronotum. Length 7-8 mm.

This widely distributed species is the most abundant of the genus in Maine and often occurs in such abundance on the rank grasses of low ground and salt marshes as to be of economic interest. Orono, July. 1905, on strawberry, July 22, 1913, willow July 30th. North Harpswell Aug. 12th. Portland Aug. 13. Very plenty on Marsh Meadow and adjacent higher ground on coarse grass, timothy, etc., Riverton Park Aug. 15th, Highmoor Farm Aug. 15th, Mt. Katahdin Aug. 22. Houlton Aug. 24, Fort Kent Aug. 28th, Grand Lakes Stream Aug. 15th. (A. P. Morse) Princeton Aug. 16th. (A. P. M.).

Chlorotettix tergatus Fitch.

Bythoscopus tergatus Fitch. Homop. N. Y. State Cab. 58, 1851.

Athysanus tergatus Southwick. Science XIX, 288, 1892.

Chlorotettix tergatus Van Duzee. Psyche, VI, 306, 309, 1892.

Slightly smaller than *unicolor* and smoky yellowish rather than green, the head obtusely rounded in front. Length 8 mm.

This species has been taken only at Mt. Katahdin near the base at an altitude of about 1500 feet and at Portland on coarse grass near the tide flats. It is too scarce to be of any economic importance.

Chlorotettix lusoria Osborn and Ball.

Chlorotettix lusoria O. & B. Iowa Acad. Sci. Proc. IV, 226, 1896.

This looks very much like *tergatus* in color and in size but the head is much more pointed the vertex being much longer at middle than next the eye. Length 7-7.5 mm.

This appears to be quite rare in Maine, one specimen being taken at Orono, Aug. 6th, and one at Mt. Katahdin, 1000-1400 ft., Aug. 22. The locality farthest to the east hitherto recorded is eastern N. Y.

Neocoelidia tumidifrons Gillette and Baker.

Neocoelidia tumidifrons G. & B. Hemip. Colo. p. 104.

Neocoelidia tumidifrons Osb. & Ball. Iowa Acad. Science IV, 183, 1897.

One specimen, female, of this peculiar species was taken at Orono, July 3rd, in a boggy pasture. It agrees well with the description of the female as given by Osborn and Ball, but lacks the black spots on the scutellum as described for the male in the original description.

Light green female unmarked, male with two black spots on scutellum, the head rounded, subconical in front, the frons swollen. Length 4.5 mm.

As this species was described from Colorado and has not hitherto been recorded for localities east of Iowa this record gives it a very much wider range. It is evidently quite rare here and certainly has no economic importance at present.

Jassus olitorius Say.

Jassus olitorius Say. Acad. Nat. Sci. Phila. Jour. VI, 310, 1831.

Jassus subbifasciatus Say. Acad. Nat. Sci. Phila. Jour. VI, 310, 1831.

Jassus olitorius Van Duzee Buf. Soc. Nat. Hist. Bul. V, 200.

The female of this species has a brown color with two lighter bands across the elytra, and the male is darker, the head yellow and there are no distinct bands on the elytra. Length ♀ 6, ♂ 5 mm.

This species is not represented by any specimens in the Maine collections, but I am confident that it was seen in the field, though no definite record appears. While it is quite a common species in the eastern United States generally it seems to reach an eastern or northern limit within the state. Provancher records it for Ottawa, Canada, but not for Quebec.

Cicadula variata Fallen.

Cicadula variata Fallen. Acta. Holm., XXVII, 34, 1806.

Cicadula variata Van Duzee, Buf. Soc. Nat. Hist. Bull. V, 200.

Usually a little larger than *6-notata* the vertex with two round black spots near the hind border and two angular black spots at the front which extend down on to the front. The elytra vary in intensity but dark specimens show a dusky stripe enclosing a paler spot on inner margin making a round spot on closed wings. Length 4 mm.

The species varies in depth of color and in some specimens referred here the spots on the vertex are faint or even wanting. It is distributed over northern Europe as well as America but is usually much less abundant than *6-notata*. Our Maine specimens were taken at Orono, Aug. 5th and North Harpswell Aug. 12th.

European records mention it as occurring on oak but American records seem to have omitted mention of food plant.

Cicadula suffusa n sp.

Light greenish, the elytra milky translucent, vertex with two large round black dots, anterior portion and under part of base tinged with orange red. Length 5 mm.

Vertex short, rounded, slightly angular in front, narrowing to base of clypeus, clypeus long, scarcely widened at apex. Pronotum rather short, elytra with costal obscure.

Color yellowish green, the head, especially anterior part of vertex and base of front, tinged with orange red, two rather black spots behind anterior border of vertex. Pronotum greenish, scutellum yellowish green, elytra greenish milky, veins, yellowish at base, brownish toward tip. Underneath yellow. Pectus and disk of vertex and ovipositor black.

♀ last ventral segment longer than preceding. Hind margin simple. ovipositor reaching only to tip of pygofer.

This species has been recognized from a number of localities. One specimen from Chicago, Ill., collected by J. G. Sanders. 7-21-03. One specimen Sault St. Marie, Canada, July '04, collected by Parish. Four specimens Orono, Maine July 18th and 31st, Ft. Kent Aug. 28th, 1913, July 18th, 1914.

This species is distinctly characterized by the prominent black spots on vertex and bright orange-red coloration of the front part of head. It evidently has a wide range although it has been rarely secured.

Cicadula pallida n sp.

Small light gray species with orange-yellow vertex and face without distinct spots or bars. Length 2.5 to 3 mm.

Vertex obtusely angulate, broad; front narrowing uniformly to base of clypeus. Clypeus elongate narrowing to tip, lorae large, narrowing, apically, touching border of face; pronotum short, strongly arched in front, truncate behind; scutellum short; elytral veins distinct.

Color vertex and anterior border of pronotum yellow tinged with orange. Face dull yellow with suffusion of brownish, posterior part of pronotum and scutellum yellowish, elytra pallid, subhyaline, smoky toward apex, veins whitish except near tip, brownish at apex. Below yellowish, venter black, last ventral segment pygofer and ovipositor yellow, tip tinged with orange or brown. Genitalia of female,—last ventral segment truncate behind, ovipositor reaching tip of pygofer, short, transverse scarcely angled at tip. Male valve long, rounded posteriorly. Plates broad at base, narrowing at middle, terminating in slender acuminate points, distinctly ciliate, extending to tip of pygofer.

Described from a number of specimens collected at Orono, Maine August 30, 1913. This species is slightly smaller and broader than the average *6-punctata*. The uniform absence of spots, with the orange tinge and pallid elytra seem to give it a well marked separation.

Cicadula slossoni Van Duzee.

Cicadula slossoni Van Duzee. Can. Ent. XXV, 281 (1893).

Smaller and darker colored than *variata* or *6-notata* with vertex dots more like *6-notata* and wing pattern more like *variata*. The vertex with two small dots near base, two broad quadrangular spots between eyes, usually a median black line and with conspicuous frontal arcs. The elytra in darker specimens show a pale whitish round spot on the combined claval areas. Length 2.5-3 mm.

Collected in considerable numbers from grass in a boggy tract of a pasture at Orono, Aug., July 31st, and at North Harpswell Aug. 12th. At Highmoor Farm Aug. 15th it was swarming by millions on a *Juncus* in wet land with *Helochara communis*. At Mt. Katahdin it was taken on the tableland and summit Aug. 21st, at altitudes of 4500 to 5300. Also taken at Kineo Aug. 17 on golf links and at Fort Kent in low ground pasture.

While heretofore this has been counted a rather rare species the great numbers observed in pastures must give it economic importance, especially if the species of *Juncus* on which it lives are considered of any forage value.

Cicadula pоторia Ball.

Cicadula pоторia Ball. Canad. Entom. XXXII, 346.

A very small nearly black species, the females with two narrow yellow or white lines on the vertex, the males with head entirely black. The head is distinctly produced, much more so than in *slossoni*. Smaller and darker than *slossoni*. Length 2 mm.

This was taken in considerable abundance at North Harpswell Aug. 12th, in low ground from a small grass probably a species of *Juncus*. The species was described from specimens taken at Ames, Iowa; and this occurrence at so remote a locality without its appearance at intermediate points is of interest. No doubt it will be found in intervening territory if collections are made from the proper plants at the proper season. It is so small as to be very easily overlooked even after being taken into the net.

Cicadula 6-notata Fallen.

Cicada 6-notata Fallen. Acta. Holm. XXVII 34, 1806.

Cicadula 6-notata Southwick. Science XIX, 288, 1892.

Cicadula 6-notata Osborn. Bull. 108 Bur. Ent. U. S. Dep. Ag.

This is a small yellow species easily recognized by the six black dots on the vertex. The front has a double series of black arcs. Length 4 mm.

The larvae have the form of the adults and the black dots of the vertex have the same arrangement as in the adults.

This is one of the most generally distributed species encountered in the state and it must probably be counted one of the most injurious on account of its numbers and the crops affected. It has been observed at Orono, being fairly common in oats and timothy July 31st on the Station grounds but not so abundant as to occasion marked injury, and on Aug. 1st both larvae and adults were noted in timothy. It was also

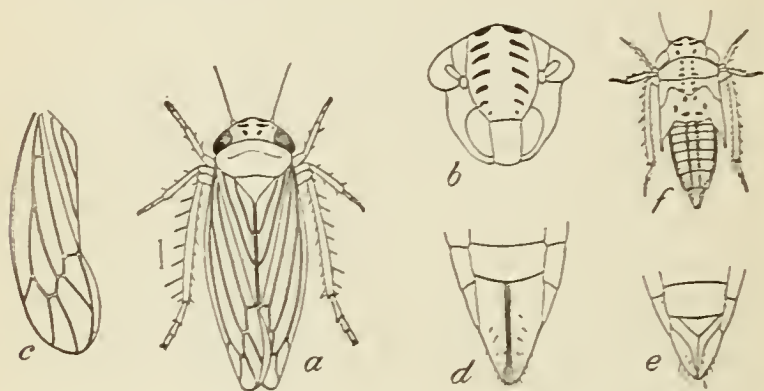


Fig. 34. The six-spotted leafhopper (*Cicadula 6-notata*): a. Adult; b, face; c, wing; d, female genitalia; e, male genitalia; f, nymph. All enlarged. (From U. S. Dept. Agric. Bureau of Entomology—Bul. No. 108.)

taken on garden plants Aug. 9th. Other records are North Harpswell, Aug. 12th, where it was quite plenty on oats and fairly common in pastures, especially low ground. Portland, Aug. 12th, in marsh meadow and adjacent to grass, Highmoor Farm Aug. 15 on oats, grass, timothy, potatoes, Mt. Katahdin Aug. 21st, Houltton Aug. 24th, Ft. Fairfield Aug. 25th, Phair Aug. 25th, common on oats and grass. Ft. Kent Aug. 28th, oats and grass, Princeton Aug. 16th, Kineo Aug. 17th.

At Highmoor Farm this species was found quite abundant and considerable injury to oats could be credited to it. The leaves showed much evidence of punctures often associated, probably followed by, attacks of rust or fungous disease. In many instances as had been observed by Dr. Surface, punctures at the base of the glumes passing through to the kernel were evidently responsible for injury to the grain.

It occurred also on many other plants, commonly on grasses, timothy especially; but a more unusual occurrence was noticed on potatoes and corn. This occurred probably only on the ripening of the adjacent oats and migration of the hoppers as no larvae were observed on either of these crops. The occurrence on corn is especially interesting as it is, I think, not only the first occurrence for this species but the first time I have encountered any of the jassids living on this crop. In no case was the insect present in excessive numbers and still the injury to oats was sufficient to deserve attention.

The results of a study of the life history of this species in 1914 will appear in a forthcoming bulletin.

Balclutha punctata Thunb.

Cicada punctata Thunberg. Act. Ups. VI, 21, (1782).

Jassus punctatus Walker. Homop. 877, III.

Gnathodus punctatus Fieber. Verh. Zoöl. Bot. Ges. in Wein. XVI, 505.

Typhlocyba punctata Fitch. Prov. Pet. Faune Canad. III, 301, 1890.

Gnathodus punctatus Van Duzee. Am. Ent. Soc. Trans. XXI, 307.

Varies from light gray to green but distinctly marked with a number of black spots on the elytra. The head is short, rounded in front nearly the width of the pronotum, the body long and slender. Length 4 mm.

This is a widely distributed and very common species throughout the state as also throughout a great range in North America and Europe. It is found most commonly in grassland or on cereal crops but appears to have a wide range of food plants. In Maine it has been taken in numbers from meadows especially those including timothy and clover at Orono, North Harpswell, Portland, Highmoor Farm, Mt. Katahdin, Houlton, Fort Fairfield, Mars Hill, Phair, Fort Kent. Also common in oats at Orono, Highmoor Farm and Mars Hill. Other localities without special record of food plants are Grand Lakes Stream, Aug. 16th. (A. P. M.) Ambajejus, Aug. 19th, Kineo, Aug. 17th. Adults have been taken from July 29th to Aug. 28th but larvae have also been noticed as late as latter part of July.

The species is to be counted of distinct economic importance and there can be no doubt that meadows especially suffer a considerable loss from their drain upon the grass. From what is known of the life history it is quite certain that the measures used for the summer treatment of other species will be of value and it is probable that where practicable the burning in late fall or early spring will prove useful.

Balclutha impictus Van Duzee.

Gnathodus impictus Van Duzee. Canad. Entom. XXIV, 113, (1892).

Similar to *punctatus* but usually light green or gray with no trace of spot. The head somewhat more produced or rounded. Length 4 mm.

Specimens of this species are recorded for Orono, July 28th, Aug. 5th, North Harpswell Aug. 12th, Portland, Riverton Park, Aug. 14th, Mt. Katahdin Aug. 22nd.

Lack of the black spots seems to be about the only decisive character separating this form from *punctatus* but the facies is usually sufficiently different to give confidence in the separation. It is much less common and hence may be ignored from the economic standpoint.

TYPHLOCYBIDAE.

The members of this group are as a rule readily separated from the other Jassidae by the four longitudinal veins of the elytra which run without forking to the cross nervures. The apical cells are four and with very few exceptions the ocelli are wanting. The following key

to the genera is given by Prof. Gillette and includes all the known American genera and all of these except *Alebra* have already been taken and it is probable that *Alebra* will yet be found as two species have been recorded for New York, and one or both of these should occur in Maine.

KEY TO NORTH AMERICAN GENERA.

- A. Sectors of the posterior wings ending in a marginal vein.
 - B. Elytra with an appendix beyond the clavus *Alebra*.
 - BB. Elytra without appendix
 - C. Two apical cells in posterior wing *Dicranura*
 - CC. One apical cell in posterior wing *Empoasca*
- AA. Sectors of the posterior wings ending in wing margin, no marginal vein.
 - Sectors 8 and 2 uniting so that only three veins extend to the margin *Typhlocyba*
 - All four sectors extending to the wing margin *Eupteryx*

Genus *Dicranura*. Hardy.

The species of this genus found in Maine are slender with pointed heads and are readily separated from the related forms by the marginal vein in the hind wing, absence of appendix and presence of two apical cells in hind wing. The Maine species may be more readily placed by help of the following key.

- A. Elytra with a deep triangular cell on costal margin *cruentata*.
- AA. Elytra with apical cell on costal margin lanceolate or wanting.
 - a. Elytra milky white, nervures indistinct *communis*.
 - aa. Elytra yellowish or pinkish.
 - b. Venter yellow *feberi*.
 - bb. Venter nearly or entirely black *carneola*

Dicranura communis Gillette.

Dicranura communis Gillette. Proc. U. S. Nat'l Mus. XX. 718.

Light gray or whitish without markings, the head pointed. Length 3 mm.

This species has occurred in considerable abundance in some localities, the records being Orono, Aug. 5th; Black Cap, Mt., Aug. 10th; Portland, Aug. 13th, where it was taken from grass near the tide water or salt marshes, and Highmoor Farm from grass and oats. At Portland and Highmoor Farm especially it was plentiful enough to be counted of economic importance.

Dicranura cruentata Gillette.

Dicranura cruentata Gillette. Proc. U. S. Nat'l Mus. XX. 717.

This is a milky white species with a black point at the end of the clavus. The head is rounded in front not so distinctly pointed as *communis*. Length 3 mm.

Evidently this species is quite rare or else closely confined to one food plant. Our only record is from two specimens taken from witch hazel at Orono, Aug. 13th. I refer it to this species though these specimens lack any red marking or smoky discoloration mentioned by Gillette but in other respects they agree closely and unless it be found that these features are constant it can not be separated. I am not aware that the food plant has been recorded hitherto, and no observations have been made on its life history. The species has evidently little economic interest.

Dicraneura fieberi Löw.

The occurrence of this species in cultivated grasses makes it one of the species to be recognized as of economic importance although so far it has been observed only in small numbers in Maine.

It is a small slender species about 3.5 millimeters long, of a light yellow color with no conspicuous markings, but some specimens show a distinct orange tinge on the front of the head.

It has been taken at Orono in timothy meadow not abundantly, but along with other species it must add its share to the drain upon the hay crop.

The species has a wide range throughout Europe and North America whether of recent introduction or not cannot be stated and in some localities it has been observed in such abundance as to have a distinct economic importance. Adults occur in mid-summer, Aug. 1st at Orono, and it is certain that nymphs develop earlier in the season but no exact data on time of appearance or number of generations here have been secured.

Dicraneura carneola Stal.

Typhlocyba carneola Stal. Stett. Ent. Zeit. XIX, p. 196 (1858).

Dicraneura carneola Gillette. Proc. U. S. Nat'l Mus. XX, 722.

Light yellow the head produced, vertex roundly angled before, without markings but there is frequently a suffusion of rosy color on head, thorax and elytra, differs from *fieberi* in less produced head and presence of dark markings on abdomen. Length 3.30 mm.

The basis of separation between this species and *fieberi* seems slight especially as with the Maine specimens it is possible to find many cases where the black markings of the abdomen are more or less developed and with no other positive character one may be at a loss to distinguish them.

Highmoor Farm Aug. 16, Portland Aug. 15, Orono Aug. 1, 1913.

Carneola has been a quite abundant and injurious species in the western part of the country and as it occurs on grasses, oats, wheat, etc., it deserves a more careful study to determine its abundance and distribution in the state the extent of its attack upon different cultivated crops and such facts as to its early stages as may suggest measures of control.

Empoasca smaragdula Fallen.

Cicada smaragdula Fallen. Hemip. Suec. Cicad. p. 53, 1829.

Empoasca smaragdula Gillette. Typhlocybiidae U. S. Nat. Mus. Proc.

Light yellowish green with a distinct smoky or black stripe following the sutural line of the elytra. Length 4 mm.

This is a common species over a large portion of the United States as well as Europe and in Maine is met with on willows generally. It was taken this season at Orono, on *Viburnum* July 22, on willow Aug. 5th; Portland, Aug. 13th; Highmoor Farm, Aug. 15th; Mt. Katahdin, Aug. 22nd; Houlton, Aug. 24th; Ft. Kent, Aug. 28th.

While commonly present it has not been noted in excessive numbers and it may be counted as of rather slight economic importance.

Empoasca atrolabes Gillette.

Empoasca atrolabes Gillette. Proc. U. S. Natl. Museum XX, 736.

Dark green without markings except a distinct black spot at end of clavus, the tarsi blue. Last ventral segment with a deep notch at each side of the hind border leaving a central produced lip as seen from ventral face but, with a slightly different angle, this lip is shortened to have the appearance shown in Gillette's figure. Length 3.75 mm.

This is a very abundant species on the alder and is sometimes taken on plants adjacent to this bush but the alder must be its favorite food plant if not the exclusive host plant for the growth of the larvae, as specimens have been taken in large numbers from clumps of alder bushes when surrounding bushes showed few or none.

It occurs all over the state and our records show captures at Orono, Aug. 10, '05, July 30, '13; North Harpswell, Aug. 12th; Grand Lakes Stream, Aug. 16th; Highmoor Farm, Aug. 15th; Phair, Aug. 26th; Fort Kent, Aug. 26th.

The economic status of this species depends on the value assigned to its host plant, the alder, which is one of the most common shrubs of the state. Inasmuch as its foliage adds much to the scenic beauty of the state it may be fair to count it as having economic value and its insect pests therefore injurious.

Empoasca unicolor?

This species is interesting as one of the rather rare cases where a leafhopper has adapted itself to feeding on coniferous trees. The specimens taken so far were all secured from arborvitae or from other conifers where the food plant was noted.

The insect is about three and one-half millimeters long, of a dark green color with no markings and very well matched in color with the leaves of the plants on which it occurs.

While not in large numbers it was found distributed on a number of different trees near the station building Aug. 2, and was found on both arbor vitae and white pine Aug. 5th. In present numbers it can not be

counted as of much economic importance and unless it shows a tendency to increase excessively at times it may be ignored from the practical point of view.

Empoasca obtusa Walsh.

Empoasca obtusa Walsh. Proc. Bost. Soc. N. H. IX, p. 316, 1864.

Light green the head very slightly produced, female 4.25 to tip of wings, 3.25 to tip of ovipositor.

Taken on willow at Orono, July 30; at Veazie on Aspen poplar, Aug. 6th; Ft. Fairfield, Aug. 26; Ft. Kent, Aug. 28 and 29; common willow, Highmoor Farm, Aug. 15th; Portland, Aug. 13th; N. Harpswell, Aug. 12, 1913.

Some of these specimens show a slight sinuation of the last ventral segment of the female but otherwise seem to agree much better with *obtusa* than with *aureoviridis* Uhl. However these species are evidently very closely akin.

While sometimes fairly common they can hardly be said to have much economic importance in the numbers in which they usually occur.

THE APPLE LEAFHOPPER.

Empoasca mali.

This species was found in considerable numbers affecting not only apple trees but potatoes and beans and while not in such abundance as to cause great destruction, it is easy to conceive that they may so increase as to cause the same serious losses that have been accorded to it on apple and alfalfa in other parts of the country. It is a minute green species with about 6 whitish dots along the front border of the pronotum its length is about 3 mm. The life history of this species has been studied quite extensively in Minn., Iowa, and Missouri and while there is some disagreement as to the condition in which the winter is passed, the main points in the life cycle are fairly well known. The usual method of hibernation for the other species of this family is in the adult stage. Adults being secreted under leaves or rubbish in thickets and other somewhat protected places and these hibernating adults migrate during early spring to deposit eggs upon the various food plants but especially upon apple. According to R. L. Webster, who has studied the species particularly for Iowa, there is hibernation of eggs in the twigs of apple or other plants and appearance of young in early spring. Dr. Hasemann considers that the usual method of hibernation for Missouri is in the adult stage. As no observations have been recorded concerning this point for Maine it is impossible to say positively but the practical bearing would not seem to be of very great significance for this region as the early appearing nymphs from either hibernating adults or eggs, would be open to attack about at the same time.

The young hoppers are light green or yellowish and occur especially upon the underside of the leaves and usually ranged alongside the mid-rib or larger veins of the leaf. The development of the larvae is rather rapid and for Maine it is probable that at least two generations may be produced as both adults and nymphs were found in mid-summer.

The distribution of this species covers all of the state and its range of food plants is apparently about the same as for other sections as it was noted upon a number of different host plants, although especially upon apples, potatoes and beans. Upon the latter it was found fairly common at Highmoor Farm and Houlton. At Highmoor Farm its occurrence on beans was indicated by very distinct spots upon the leaves. The attack clearly showing that a large abundance of the hoppers would result in a very distinct withering of the plants.

The treatment of this species depends upon the plants affected, the use of two measures, the spraying and the so-called "shield" method. The success of the spraying for the species has been somewhat varied, the writer having found in treating an outbreak on potatoes that a spray of kerosene emulsion seemed to be very effective, while some observations have shown that the results were quite unsatisfactory, especially as applied to the adults. Dr. Hasemann recommends for apple a very heavy spray especially while the insects are in the nymphal stage in the early part of the season so as to secure practically extermination and prevention of the later broods. With potatoes a special spray which was directed so that the adults in leaping from the plants were certainly wet by the solution seemed however, very effective and an adjustment of the spraying machinery so that a similar result could be obtained on apple trees or nursery rows, ought, it seems to me, to be equally effective. The shield method consists in the use of a sheet of paper or canvas covered with tar or "tangle-foo;" carrying it along

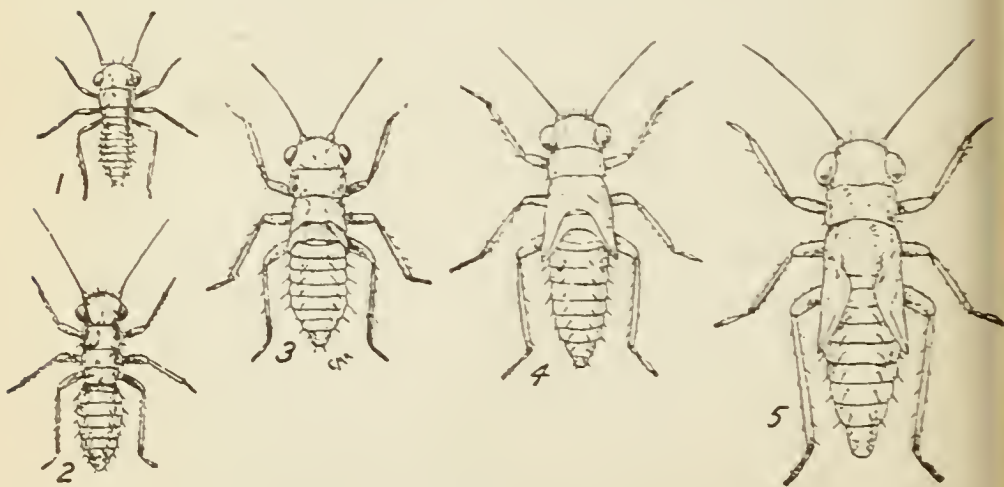


Fig. 35. *Empoasca mali*, nymphal stages 1 to 5. (After R. L. Webster, Iowa Exp. Sta. Bulletin.)

close to the plants and disturbing the plants so as to make the hoppers jump up against the shield where they will be caught in the sticky material. Such an apparatus mounted on wheels and drawn through nursery rows has been recommended for freeing nursery stock from the species and some similar adjustment may be made for potatoes or beans in field rows.

Eupteryx nigra Osborn.

Eupteryx nigra Osborn. Rept. N. Y. State Entomologist, XX, 543.

Above black except anterior border of vertex and costal border of elytra; below greenish white except pygofers which are smoky black. Length 3.75 mm.

Collected on ferns at Orono July 29th, Aug. 5th, Bar Harbor Aug. 31st, July 10, 1914.

These specimens agree very closely with the description and types which were females but a male taken July 29th differs in the darker front, the absence of white costa and the dark color of the abdominal segments, the margins only being white.

The females agree in all details except that the central abdominal segments have dusky bands. The original description was based on a specimen taken at Jamaica, Long Island and one from Columbus, Ohio, so the present records considerably extend the range of the species. The species is of no particular economic importance but is of interest as one of the few species that occur on ferns.

Eupteryx flavoscuta Gillette.

Eupteryx flavoscuta Gillette. Proc. U. S. Nat'l Mus. XX, 749 (1898).

Yellow beneath and suffused with smoky black above the front border of the vertex, a quadrangular spot on central base of pronotum and the scutellum, border of costa at center and a more or less extended spot on commissure, yellow. Length 3 mm.

Our specimens were collected at Orono, July 8th, Aug. 5th, and at Mt. Katahdin Aug. 20-22nd, Kineo, Aug. 17th. They agree well with Gillette's description but most of our specimens are darker above and the yellow spots on costa and clavus would seem to be larger and more brightly colored. They occur on ferns and usually in very small numbers.

Typhlocyba obliqua Say.

Tettigonia obliqua Say. Acad. Nat. Sci. Phila. IV, 342, 1825.

Erythroneura obliqua Fitch. Homop. State Cab. N. Y., p. 63, 1851.

Typhlocyba obliqua Gillette. Proc. U. S. Natl. Mus. XX.

Light yellow with two distinct oblique red stripes on the elytra following the line of the claval suture, one on the clavus and the other on the disk of the corium. Length 3.5 mm.

This species is less common than the *comes* which is so universally common on grape but it sometimes appears in large numbers. The Maine specimens are recorded for June 11 as taken from "sweet grass," but it is probable that they had scattered from some other plant.

Typhlocyba vulnerata Fitch.

Erythroneura vulnerata Fitch. Homop. N. Y. State Cab. p. 62, 1851.

Typhlocyba vulnerata Gillette. Proc. U. S. Natl. Mus. XX.

Dark gray or purplish with yellow spot and some slender red lines, with a dark spot at end of clavus. Length, 3.5 mm.

This species appears to have been rarely observed in the state though in other parts of the country it is often abundant. One record for Orono, Aug. 22nd, 1911.

THE GRAPE LEAFHOPPER.

Typhlocyba comes Say.

Typhlocyba comes Say. Jour. Acad. N. S. Phila. IV, p. 343 (1825).

Erythroneura vitifex Fitch. Tr. N. Y. State Agr. Soc. XVI, p. 392 (1856).

Minute pale yellow with bright red spots and three black points on the elytra. Length 3 mm.

This is the very common and widely distributed species occurring on grape vines and it doubtless occurs everywhere in the state where grapes are grown. Records run north to Ft. Kent. It has not been observed in as great abundance here as in some other parts of the country but I have not had opportunity to inspect vineyards to any great extent and cannot assume that there is any lack of abundance as a general thing.

Where grape growing is of importance attention to the ordinary means of control is desirable. Spraying with the tobacco decoctions or extracts and the shield method of capture are the main reliance.

The species is a variable one but Gillette has considered the *vitifex* of Fitch as covered by the original description of *comes* of Say.

Typhlocyba comes var. *ziczac* Walsh.

Erythroneura ziczac Walsh Proc. Bost. Soc. Nat. Hist. 1X, p. 317, 1864.

Typhlocyba comes variety *ziczac* Gillette Pr. Nat'l Mus. XX, 761.

This variety of *comes* has been taken abundantly from *Cornus* at Orono in July, 1914. It differs from the typical form in the zigzag brown marking of the elytra which are darker than in the *vitifex* form.

Typhlocyba comes var. *vitifex* Harris

Tettigonia vitifex Harris. Enc. Ann. VIII, p. 43, 1831.

Typhlocyba comes var. *vitifex* Harris Gillette. Pr. U. N. M. XX, p. 760.

This is probably the most common variety in this section of the coun-

try and differs from the other varieties in the more distinct yellow color and the small but bright red spots on the elytra.

Typhlocyba querci Fitch.

Typhlocyba querci Fitch Homop. N. Y. State Cab. p. 63 (1851).

Typhlocyba querci Gillette Proc. U. S. Nat'l Mus. XX, 766. (1898).

White, the elytra semitransparent with three smoky spots in the ends of the discal cells next the cross veins. Length 3 mm.

Specimens of this species have been taken at Orono, Aug. 1st and 5th July 29th; in Deering Park, Portland, Aug. 14th. There is also a specimen in the station collection credited to "Me." but without locality or date.

The species is known to occur at times in enormous numbers and in such cases must cause a serious drain on the trees affected. While the typical form occurs regularly on oak, specimens of this as well as of the varieties are found on other trees. At Monmouth a number were taken from Buckeye but an oak tree was near at hand and migration even for nymphs an easy matter. Where so abundant as to require attention kerosene emulsion or a tobacco solution spray is recommended.

Typhlocyba querci var *bifasciata* Gillette and Baker.

Typhlocyba bifasciata Gillette and Baker, Bull. 31, Colo. Agr. Exp. Sta. p. 111, 1895.

Typhlocyba querci var *bifasciata* Gillette Proc. U. S. Nat'l Mus. XX, 766.

This well marked variety of *querci* has been taken in a larger number of localities in the state than the typical *querci* and while quite common it has not at any place been found swarming in such immense numbers as I have noticed in other states.

This variety differs from the typical form in the presence of two broad smoky brown or black bands on the elytra. The general color is yellow, the scutellum smoky black. Length 4 mm.

Specimens have been taken at Orono July 31, Aug. 5th and 12th; North Harpswell, Aug. 12th; Portland (Riverton Park) Aug. 14th; Mt. Katahdin, Aug. 22; Houlton, Aug. 24th; Ft. Fairfield, Aug. 26th; Van Buren, Aug. 27th.

Typhlocyba lethierryi Edw.

Typhlocyba lethierryi Edwards. Hemip.-Homop. British Islands, p. 216.

Typhlocyba lethierryi Gillette. Proc. U. S. Nat. Museum, XX, p. 771.

Similar to *rosae* but sulphur yellow instead of pale yellow. The bright yellow terminates at apical cross nervules. Eyes dark and ovipositor black. Length 3.5 mm.

Our specimens were taken at Orono Aug 18th and 24th, 1914. Edwards states that it occurs on various trees but more particularly on the elm. So far, it has been noticed only in small numbers.

Typhlocyba tenerrima Herrick-Schaeffer.

Typhlocyba tenerrima Herrick-Schaeffer. D. Ins. p 124. 10 u. 164.16 (vide Melichar).

Typhlocyba tenerrima Gillette. Proc. U. S. Nat'l Museum XX, p. 770.

A slender pale yellow species with a series of dark spots in front of the cross nervures and black spots at ends of outer cross nervures and inner and outer apical nervule. Length 3 mm.

Specimens collected at Orono July 20th, Portland Aug. 13. Van Buren Aug. 27th, 1913.

Typhlocyba commissuralis Stal.

Typhlocyba commissuralis Stal, Stett. Ent. Zeit., XIX. 196, (1858).

Typhlocyba commissuralis Gillette. Proc. U. S. Nat'l Mus. XX, 769. (1898).

White with a black commissural line. Closely resembling *rosae* except for the black stripe running along the inner border of elytra. Length 3.5-4 mm.

This species was described from Sitka, Alaska, and Gillette has added records for Vancouver Island and Cimarron, Colorado. I have not seen any records for localities farther east and consequently the record for Maine gives it a greatly extended range. The food plants mentioned by Gillette are alder, willow and weeds. The species is closely related to *rosae* but larger and Gillette says that the commissural line is wanting in some specimens in which case they are not distinguishable from *rosae* except by the slightly larger size.

The species evidently has no economic importance in Maine as aside from its extreme rarity it does not attack plants of special value.

The specimens on which our record is based were taken at Van Buren Aug. 27th, 1913, and Orono Aug. 18th and 19th, 1914.

THE ROSE LEAFHOPPER.

Typhlocyba rosae L.

This minute and widely distributed species has been taken at Orono in 1913 and 1914, and while not in such numbers as are sometimes noted the leaves on some of the bushes affected showed a very decided whitening from their punctures. It will doubtless be found generally distributed over the state wherever roses are cultivated. Portland, Aug. 14. Westbrook (Stover).

This species is nearly white without any conspicuous dark markings, about three millimeters long quite slender and usually conspicuous only when the numbers have become sufficient to give the leaves a spotted or whitened appearance.

Since it is the only common species affecting the rose there is little difficulty in identifying it.

The delicate white cast nymphal skins adhere to the leaves and are a sure indication of the presence of the insect even if adults or living nymphs are not seen. On Aug. 2nd, when observations were made only adults and nymphal skins were observed. The young develop during the early summer and it is supposed that adults pass the winter hidden among dead leaves and other rubbish at the surface of the ground. Where the insect becomes troublesome a kerosene emulsion, or tobacco decoction spray may be used. Specimens apparently belonging here have been taken also from the witch hazel.

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